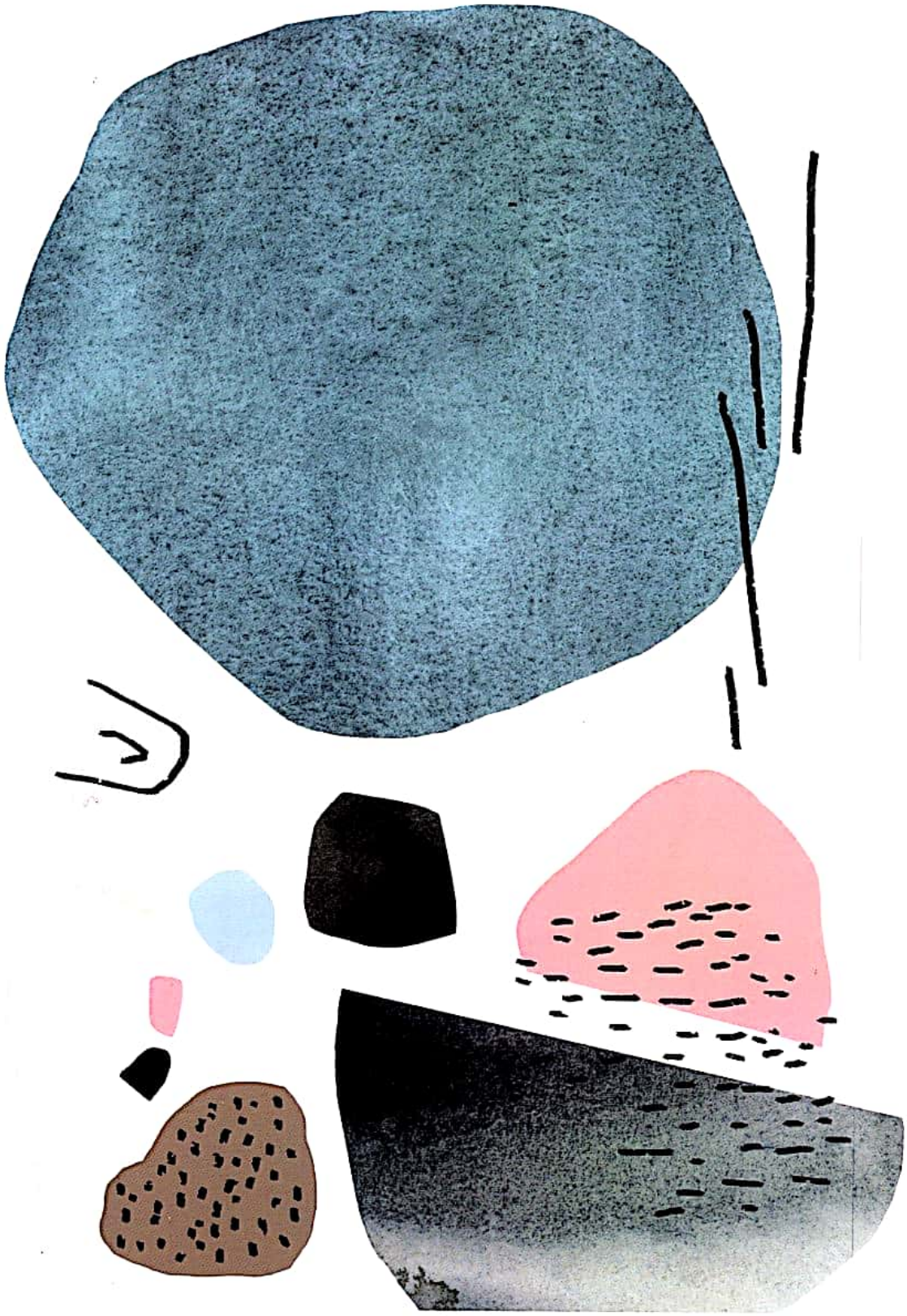

Community Medicine Vol 2

Transcript-based notes on video lectures in Marrow by
Dr Mukhmohit Singh, M.D Community Medicine

M4

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About the Faculty

Dr Mukhmohit Singh
MD (Community Medicine)

Dr Mukhmohit Singh is a much-loved faculty of Community Medicine. He has been actively involved in PG entrance & USMLE training since 2011 & to his credit, he has taught over 10,000+ successful students. He has been awarded a Gold Sponsorship Award for work on COPD at the prestigious European Respiratory Society.

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Community medicine

Marrow Edition 4

Volume - 2

MARROW

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Instructions

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- Notes will not be made for Optional/ Image-based/ MCQ videos.

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Disclaimer

- These Notes do not cover all the points, especially conceptual points, discussed in the videos. The information in this book is meant to complement Marrow videos and should be used in conjunction with the videos. Special emphasis on certain points and MCQ solving approach has to be understood from the videos only.
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DEMOGRAPHY TRENDS

Demography

- Demos means Population, Graphy means Study
- It is the scientific study to Ascertain the Growth of the population

- It includes:

1) Demographic Cycle

2) Demographic trends & variables

- Annual Growth Rates
- Age pyramids
- Demographic Gift / Dividend
- Dependency Ratio
- Demographic Trap
- Demographic Processes
- Vital stats
- Population stats
- Sex Ratio
- Population Urbanization
- Life Expectancy
- Literacy Rates

3) Fertility Indicators

- GFR – General Fertility Rate
  TFR – Total Fertility Rate
  GRR – Gross Reproductive Rate
  NRR – Net Reproductive Rate
- Distribution of states as per TFR in india
- Fertility Related Indicators
  (I) Couple protection rate
  (II) Other indicators and formula

4) Survey Technique and data collection

- Types of Survey
- Sources of data at country level

5) International death certificate

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Demographic trends

Annual Growth Rate (AGR)

$$AGR = \frac{\text{Crude birth rate} - \text{Crude death rate}}{10}$$

↓ because of

AGR ↓

<0.5%	→ Slow Growing population
0.5 – 1%	→ moderately Growing population
1 – 1.5%	→ Rapidly Growing population
1.5 – 2%	→ very Rapidly Growing population
> 2%	→ Explosively Growing population

- AGR for India is 1.19 by 2018 i.e. ≃ 1.2%
- If AGR of a population is 1%

↓ } Doubling time

Doubles in 70 yrs

↓

This law is called 'MALTHUSIAN MODEL' given by the Scientist Malthusian

Eg: if it is 0.5% → It will double in 140yrs

2% → It will double in 35yrs

1.5% → It doubles between 35–70 yrs mostly 50yrs

d. if AGR is 1.2%, then Doubling time would be

a) 50 years
b) 60 years
c) 70 years
d) 80 years

- It takes 60 years to double, for AGR – 1.2%

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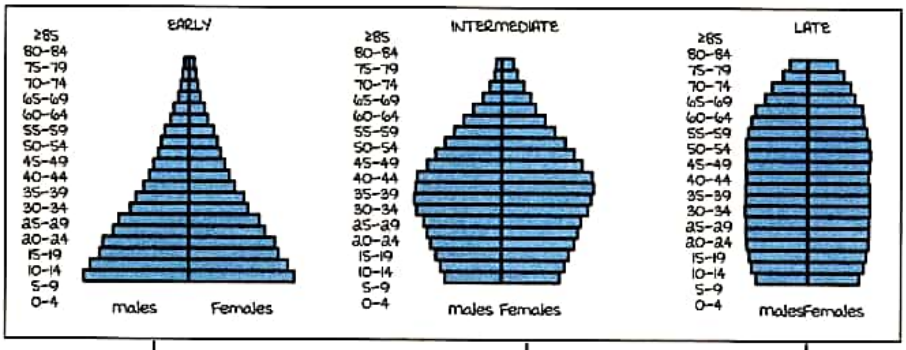
Age pyramids

- Age pyramids are Graphical presentation (histogram) of the composition of population
- On X-axis → Population
  - Right side → Females
  - Left side → Males
- On Y-axis → Age distribution



- Developing Countries
- It is a Broad Base type of Age pyramid
- It has Narrowing Apex

- For Developed Countries
- It is Broad Belly type of Age pyramid
- It is a Constricting type

In Population Pyramid A

↓

- More no. Of Births → So, Broad Base
- As the people become elderly, they die

↓

Higher Death Rates

↓

So, narrowing Apex

In Population pyramid B

- more no. Of middle Age Group population with lesser birth rates

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It can only be possible in two scenario's

1) Immigration of young Adults into the country from outside
2) This country which has Broad Belly Age pyramid was few years back a Broad Base Age pyramid

- Country with Broad Base } goes from Stage II to Stage III → Birth Rate Decreases
  ↓
  middle Age population increases
  ↓
  So, Pyramid B is Intermediate phase

Demographic Dividend / Gift

- Higher No. Of economically Productive Age Group with lower Dependency ratio
- Demographic Gift is maximum in Stage III
- It is because of Decline in Birth Rate

Dependency ratio

$$\text{Dependency ratio} = \frac{\text{No. of Dependent population}}{\text{No. of Independent population}} \times 100$$

$$= \frac{\text{Age group <14 years and Age group >65 yrs}}{\text{Population age group 15-64 years}} \times 100$$

- Young Dependency population in India → 41.1%
- Old Age Dependency population in India → 9.4%
- Total Dependency population in India → 50.55%
- It is according to status from India health Profile january 2018

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Demographic trap

- Demographic trap is Difficulty to Decline the Birth Rate
- Because of decline in Death Rate (↑ Increase in Birth Rate)
- It is seen in Stage II

Other demographic variables / determinants

1) Demographic Processes

- Fertility
- Age at Marriage
- Mortality
- Migration
- Social mobility → Movement across 'Socioeconomic status'

2) Population Stats

- Sex Ratio
- Literacy Rate
- Dependency Rate
- Density of Area

3) Vital stats

- Birth Rates
- Death Rates
- Life expectancy Rates
- Mortality & fertility Rates

Sex ratio:

$$\text{Sex ratio} = \frac{\text{No. of females}}{\text{1000 males}}$$

According to NFHS – 4 (National Family Health Survey)

↓

Sex ratio increased to 991
1000 males – In adults

Sex ratio at birth is 919
1000 males

Female deficit Syndrome

- Decrease in no. Of female Population
- It leads to Ecological imbalance

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Literacy rate

- Crude Literacy Rate → People who can Read or Write at any age

Effective Literacy Rate:

- It is the no of people who can Read and Write in any language and age > 7 years

$$\text{Effective Literacy Rate} = \frac{\text{People who can read and write age > 7yrs}}{\text{Total population of age > 7yrs}} \times 100$$

Life Expectancy

- Best measure for Assessment of Development of a country
- plays an important role in HDI (Human Development Index)
- It is the Average no. of years of Survival in that Particular country
- In India, it is 67.5 years
- Target is to achieve 70 years by 2025

Urbanisation / Settlement concentration

Centralisation → No of Population Living together because of Industrialisation / Occupation

Segregation → Population living together due to Certain Sociocultural forms

Migration = immigration - Emigration

$$\text{Migration rates} = \frac{\text{No. of Immigrants}}{\text{Total population}} \times 100$$

Isolated Dwelling → means < 10 families Living together in a small area

Small Village → < 500-600

Village → 1000-2000 Population

hallmark of village → 'Panchayat'

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Town → 2000–20,000 Population

→ Hallmark of Town

- It has 'Governing body'

↓

Municipality

City → > 20,000 upto 1,00,000 Population

→ Hallmark of City – Municipal Corporation

- It has Various Departments

(e.g) Public Water, Electricity, Health Departments

Block → It is an Administrative Unit

→ It has defined Population of 1,00,000

Megacity / metropolitan

↓

If Population is > 1 crore (10 million)

Urban Area

- If the population is of > 5000 in an area
- It has high density → > 390 Persons / Km^2

and / or

>75% Population are engaged in Non-Agricultural Occupation

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DEMOGRAPHY : STAGES

Demographic cycle

- When a new country is formed, it will have high Death Rate due to lack of health services, literacy, sanitation and environmental problems
- And high Birth Rate
- Easiest thing for a Nation to decline is death Rate

Decrease in Death Rate

↓

Population gets more

Social upliftment

Literacy

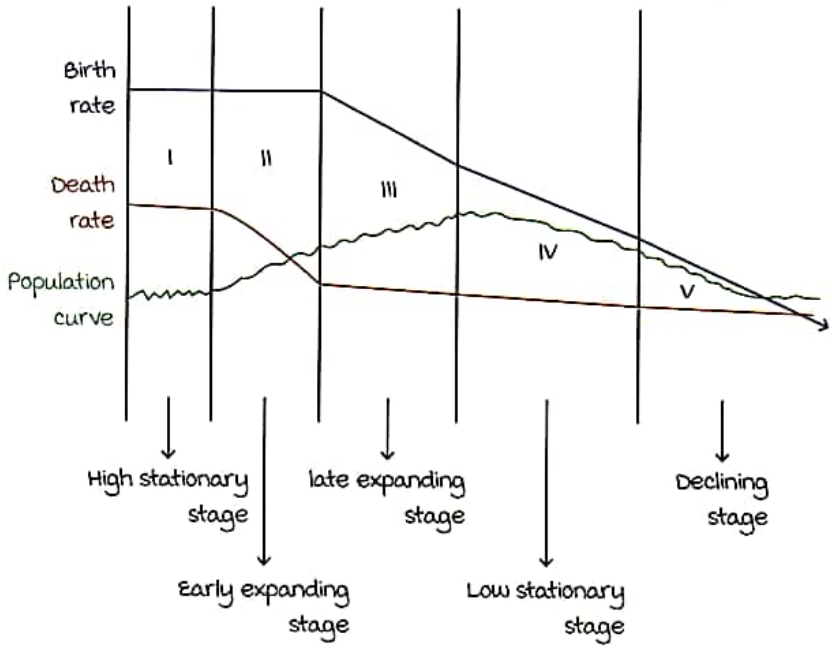
Socioeconomic Development

↓

Will result in

Decline in Birth Rates

- Death Rate has a limit to decline, but it cannot be zero
- Birth Rate declines and it can become zero



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Stage	Name	Birth Rate – Death Rate	Demographic Gap	Population	Remarks
I	High Stationary Stage	High – High	Stable	Stable	India was in stage I till 1920
II	Early Expanding Stage	High – Starts declining	Starts increasing maximum at the end	Rapid increase	1921 → Decline in Death Rate → Years of Big Divide South Asia, Africa
III	Late Expanding Stage	Starts declining – Slow Decline	Starts Decreasing	Increases	India, China, Singapore → Developing countries
IV	Low Stationary Stage	Slow Decline – Slow Decline	Stable	Stable	Belgium, Sweden, UK, Canada
V	Declining Stage	Slow Decline – very low / Almost Stable	Lowest or Even Negative	Decline	Germany, Bulgaria, Italy, Eastern European countries (GREECE) Birth Rate < Death Rate

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Demographic Gap:

- It is the difference between the Birth Rate and Death Rate
- Demographic Gap starts to increase in Stage II and maximum at the end of Stage II
- It starts to Decrease in Stage III and minimum at the late part of Stage V

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FERTILITY INDICATORS

General fertility rate

00:03:30

- Total number of live births in an area among the females in reproductive age group.
- $GFR = \frac{\text{Live birth}}{WRA} \times 1000$

WRA → Women of Reproductive Age group (15–49 years)

Total fertility rate

00:07:04

- Number of live births a female will bear during her reproductive years, assuming the age specific fertility pattern (ASFR)
- $TFR = \frac{\text{No. of live births (ASFR)}}{WRA} \times 1000$
- Age specific Fertility Rate (ASFR)

$$ASFR = \frac{\text{No. of children in a specific age group}}{\text{Total no. of female in that age group}} \times 1000$$

Gross reproduction rate

00:11:34

- Total number of daughters which a female will bear during her reproductive years assuming the age specific fertility pattern
- $GRR = \frac{\text{No. of daughters (ASFR)}}{WRA} \times 1000$

Net reproduction rate

00:13:20

- Total number of daughters which a new born girl child will bear during her entire life assuming the age specific fertility and mortality pattern

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Leave Feedback

- $NRR = \frac{\text{No. of daughters (ASFR and ASMR)}}{\text{WRA}}$

Fertility rates vs reproduction rates 00:14:46

- Reproduction rates always refer to: No. of daughters born
- Fertility rates always refer to: No. of children born
- Factor which differentiates GFR from TFR: ASFR
- Factor which differentiates NRR from GRR: ASMR
- The best indicator for "complete family size": TFR
- The most Refined / Sensitive / Best epidemiological indicator: NRR
- The best indicator for the growth of the population: NRR
- The best indicator for Family planning implementation services: NRR

Target numbers of fertility and reproduction rates 00:19:27

- Target of NRR = 1
  - It gives Replacement level
  - It indicates population stabilization
- To attain NRR = 1, we need TFR = 2.1 (due to unequal gender biased mortality → Female foeticide)
- To attain TFR = 2.1, we need Couple Protection Rate [CPR] = 60%
- These goals are a part of National Health Policy 2017
- The best indicator at Village / Grass root level: CPR
- The best indicator at administrative level (field indicator): TFR

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Classification of states based on TFR 00:28:40

- Based on TFR states are divided into:
- Non-focus states → TFR = < 2.1
- High focus status → TFR = 2.2–3
- Very high focus states → TFR = > 3
  - Bihar, Uttar Pradesh, Meghalaya

Crude birth rate 00:33:55

- $CBR = \frac{\text{No. of live births in an area}}{\text{mid year population}} \times 1000$

- Mid year population is the population calculated on 30 June / 1 July at 00:00 hours

Crude death rate 00:34:57

- $CDR = \frac{\text{No. of deaths in an area in a year}}{\text{mid year population of same year}} \times 1000$

Other terms 00:40:03

Child women ratio:

- $CWR = \frac{\text{No. of children (0–4 years)}}{\text{WRA}} \times 1000$

Pregnancy rate:

$$= \frac{\text{No. of Pregnancies}}{\text{WRA}} \times 1000$$

Abortion Rate:

$$= \frac{\text{No. of abortions}}{\text{WRA}} \times 1000$$

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Abortion Ratio:

$$= \frac{\text{No. of abortions in a particular time}}{\text{Live births in the area at the same time}}$$

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SURVEY TECHNIQUES & DEATH CERTIFICATES

- Data collection – 2 types

(I) De facto (before 1930's) – Done according to as and where basis

(II) De jure (after 1930's) – Done according to permanent residence

Survey systems

00:02:25

(I) Civil registration system (CRS)

- Registration of birth and death
- Indians: within 21 days, NRI: within 90 days
- Also known as vital registration system
- Under ministry of health and family welfare (MOHFW)

(II) Sample registration system (SRS)

- Done every 6 months (∴ Known as biannual registration system)
- Done at state and national level (∴ Known as dual registration)
- Started in 1960
- National level: Data triangulation, matching of events
- Includes: mortality rate, birth rates, annual growth rates

(III) National Family Health Survey (NFHS)

- Objective : Obtains data on health and related statistics
- Include: morbidity (fertility, mortality, anaemia, nutrition, literacy rate, quality of life) and mortality
- Last survey: NFHS – IV (2015-16)

(IV) District level house hold survey (DLHS)

- District level
- "ad hoc" survey
- Includes: Social parameter affecting health

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Leave Feedback

(v) Census

- Done every 10 years
- Under ministry of home affairs (MOHA)
- Objective: Demographic structure of a population
- 1st census: 1881, last census: 2011
- Census 1981: Included "disability"
- Census 1921: Year of big divide

Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

International death certificate 00:13:39

- 1964–69: Compulsory death certificate bill was passed in India

Part – I

- Cause of death: 1a – Immediate cause of death
  1b, c, d – Subsequent underlying cause of death

Part – II

- Other medical conditions: Which is not a direct cause of death

Others

- Manner of death (Like homicide, suicide, natural death etc)
- Tobacco usage
- Pregnancy status in WRA (Women of Reproductive Age group)
- Time interval between causes of death

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Cause of death		Approximate interval between onset and death
I		
Disease or condition directly leading to death*	(a)	.....
	Due to (or as a consequence of)	
Antecedent causes morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b)	.....
	Due to (or as a consequence of)	
	(c)	.....
	Due to (or as a consequence of)	
	(d)	.....
II		
Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....	.....
	.....	.....

*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.

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INTRODUCTION, BARRIERS & IUD

Introduction

00:02:04

Planned family:

Family which has – The 1st child birth is after 20yrs of the mother's age

- Minimum of 3 years between 2 children
- Limited size of children (2 or 3)

Objectives of family planning:

Prevent unwanted pregnancies

Limit the no of children

Limit the age of female (at the 1st child birth)

Couple Protection Rate [CPR]:

Percentage of eligible couples effectively protected against child birth by one / the other family planning methods

CPR of 60% ~ TFR of 2.1 ~ NRR of 1

↓

Required for stable population

TFR: Total Fertility Rate

NRR: Net Reproduction Rate

Eligible couple: Couple in which the female is in reproductive age group

Any contraceptive method is used

Target couple: Couple in which the female is in reproductive age group and

- Has achieved the desired family size or
- Has at least 2 to 3 live birth

Sterilisation is preferred

Eligible couples in India ~ 15–18%

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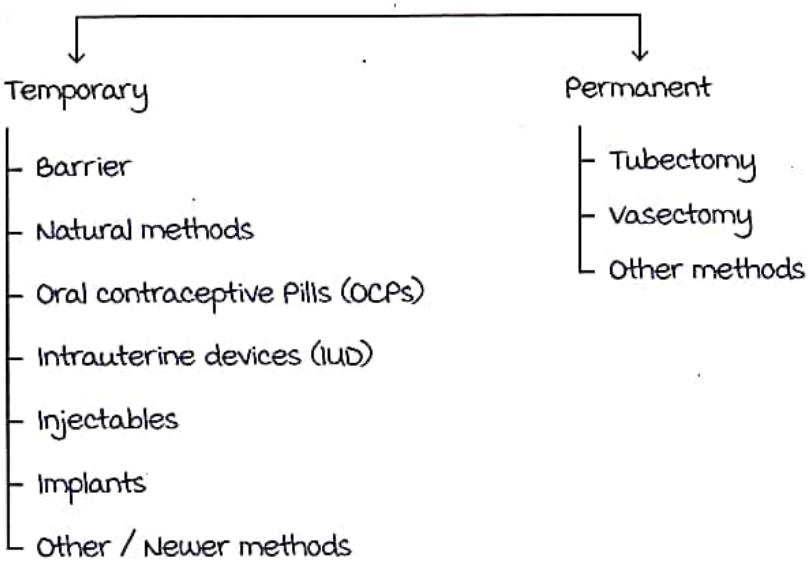
Contraceptive methods

00:10:08



Barrier methods

00:11:50

1. Condoms:

Male condoms

- Made up of latex
- Effective in preventing pregnancy, Sexually Transmitted Infections (STI), reproductive tract infections
- Failure rate 2 or 3 to 40 HWY (Hundred Women Years)
- Most common cause of failure: Incorrect usage
- Manufactured in Hindustan Latex (Trivandrum) & London Rubber Industry (Chennai)

Female condoms

- Made up of polyurethane
- Prelubricated with silicone (Spermicidal is not required)
- Failure rate: 4 or 5 to 20 HWY
- Less effective in preventing pregnancy, STIs compared to male condoms

2. Diaphragm:

- Dutch cap

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- Not recommended under the National family planning programme
- Used before intercourse and left for 6hrs postcoital

↓

Chance of Toxic shock syndrome ⊕

- Failure rate: 6 to 12 HWY

3. Vaginal sponge:
   - Brand name: Today
   - Impregnated while spermicidal: Nonoxynol - 9
   - Failure rate: 20 to 40 HWY

Intra Uterine Devices (IUD) 00:20:38

TYPES:

Ist generation IUD: Lippes Loop, Graffenberg's ring (Insert IUD)

IInd generation IUD:

CuT -220, CuT -380 → used nowadays

→ Applicable for 10 yrs

Nova T → 5yrs

Multiload device → CUT 250 ⇒ Applicable for 3-5 yrs; CUT 375

IIIrd generation IUD (Hormonal)

Mirena (LNG-20) (7-10 yrs)
- Levonorgesterol
- 20 mcg progesterone / Day
- Lowest failure rate

Progestasert (1yr)
- Natural progesterone
- Loading dose: 38 mg

⇓

65 mcg / Day
- Lowest expulsion rate

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Leave Feedbac

Mechanism of action of IUD

00:27:26

Inhibits fertilisation

- Alters the bio chemical environment of the cervical mucus

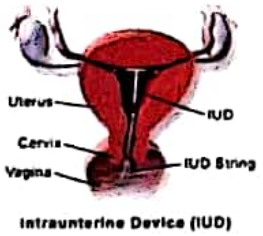
⇓

Inhibits sperm activation

- Thickens the cervical mucus

⇓

↓ Sperm motility



Intrauterine Device (IUD)

- Foreign body reaction ⇒ Inhibit implantation

IUDs are highly effective

⇓

Failure rate: 0.5–1.5

IuD with lowest failure rate: m

Contraindications of IUD

00:32:40

Absolute contraindications	Relative contraindications
1. Pregnancy	1. Previous history of pelvic inflammatory disease
2. Undiagnosed vaginal bleeding	2. Congenital malformations
3. Pelvic inflammatory disease	3. Cervical discharge
4. Cervical cancer	4. Anemia
5. Carcinoma of genital tract	5. Menorrhagia
6. Previous ectopic pregnancies	6. Unmotivated females

Time of insertion of IUD

00:35:14

- Within 10 days from beginning of menstruation

Most ideal: Initial 4–5 days of menstruation

↓

Cervical canal open

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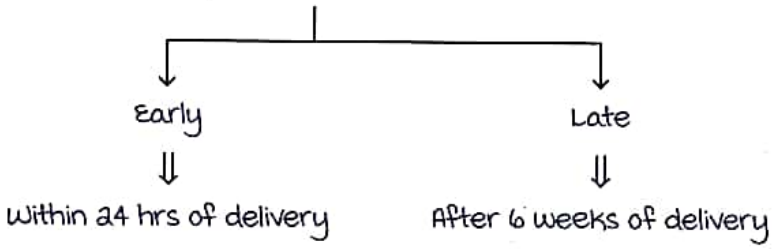
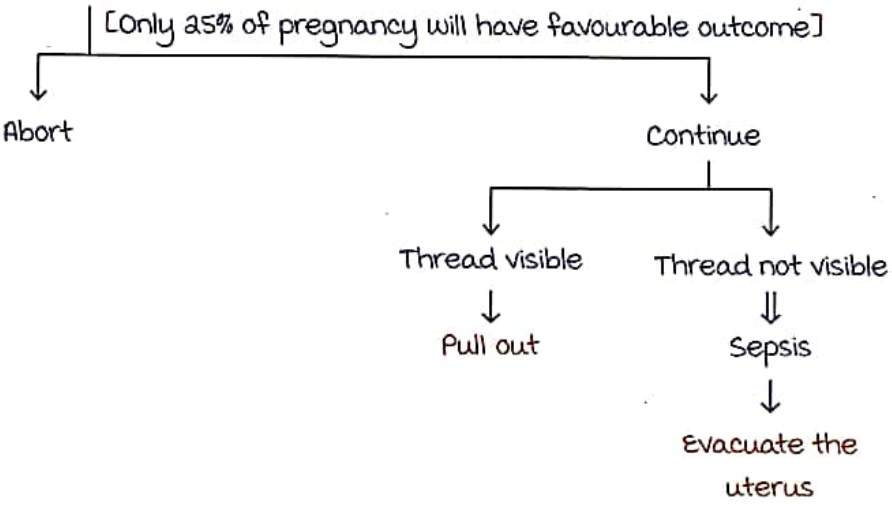
- After delivery / Lactation:



Adverse effects of IUD

00:38:35

1. Pain : most common cause of IUD removals (15–40%)
2. Bleeding : most common side effect
   - 1st generation > IInd > IIIrd
   - 10–17% of all IUD removals
3. Pelvic inflammatory disease
4. Ectopic pregnancy: Due to delayed tubal motility caused by progesterone
   - Progestosert ⇒ Rate of ectopic pregnancy: 6.8%
   - CuT, LNG ⇒ 0.2%
5. Perforation: Dangerous adverse effect
6. Expulsion: most common cause is pain
7. Pregnancy with IUD insitu:



Return of fertility after IUD usage: ~ 70% within 1 year

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OCP AND OTHER CONTRACEPTIVE METHODS

Classification of hormonal contraceptives 00:00:15

- Chemical classification
  - Pregnane: Medroxy progesterone acetate
    Megestrol
  - Estrane : Norethisterone
    Lynestrenol
    Ethynodiol diacetate
  - Gonane : Levonorgestrel
- Physical classification
  - Oral Pills
    - Combined Oral Pills
    - Progesterone Only Pills
    - Post Coital Pills
    - Long acting Pills
    - Male Pills
  - Depot Formulations
    - Injectables
    - Implants

Combined oral pills 00:03:20

- Types:
  - Mala N → National program (free) ; 21 Tablets
  - Mala D → Social marketing scheme ; 21 + 7 Tablets
  - Both types contain: Levonorgestrel → 0.15 mg
    Ethinyl Estradiol → 0.03 mg
  - In Mala D, 7 tablets of Ferrous fumarate → 60 mg used

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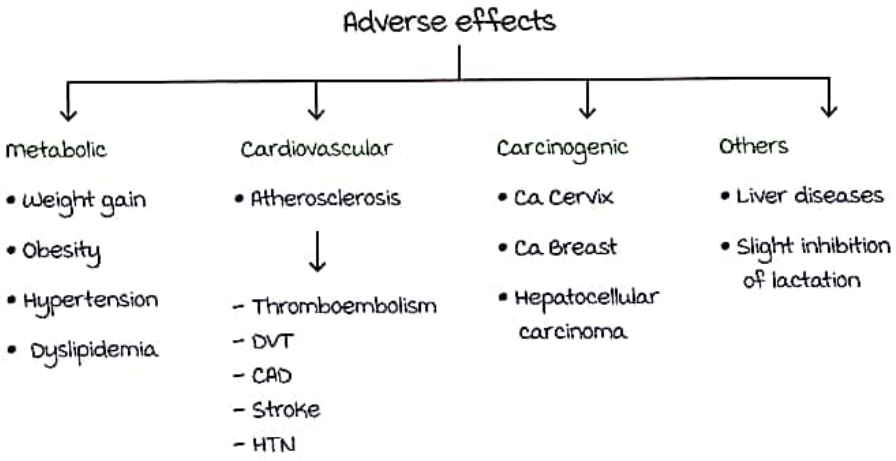
- Mechanism of Action
  - Disrupts the Hypothalamus – Pituitary axis
  - Stoppage of OCP after, 21 days lead to 'withdrawal bleed' (less amount of bleeding) → Less chance of Anemia
- Effectiveness: 99.9 % (more effective than IUDs)

Adverse effects of OCPs 00:10:30



- Ectopic pregnancy is seen in Progesterone Only Pills (POP)

Benefits of OCPs 00:18:10

1. Regularisation of menstrual cycles
2. Contraceptive benefits
3. ↓ / ⊖ Benign Breast disease / Fibroadenoma
4. ↓ Ca Ovary, ↓ Ca Endometrium, ↓ Ovarian cyst
5. ↓ Pelvic Inflammatory Diseases
6. ↓ Iron Deficiency Anemia

Contraindications of OCPs 00:21:20

- Absolute contraindications
  1. Ca Breast, Genital cancers
  2. Pregnancy
  3. Sever Liver disease

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4. Thromboembolism, DVT
5. Cardiac anomalies
6. Congenital hyperlipidemia
7. Undiagnosed vaginal bleed

- Relative Contraindications

1. Age >40
2. Smoker, age > 35 (female)
3. Diabetes mellitus, gall stone
4. Epilepsy, migraine

Injectable methods of contraception 00:24:43

- Types:

I. Progesterone only injectables

- DMPA (Depot medroxy Progesterone Acetate)
  → 150 mg IM, 3 monthly, > 35 year old female
- NET-EN (Norethisterone enantiate)
  → 200 mg, 2 monthly
- Depo Sub Q Provera 104
  → Depo Medroxy Progesterone Acetate Subcutaneous (DMPA. SC)
- Antara Program (2017-2018)
  → MPA, 150 mg IM, 3 monthly

II. Combined Injectables

- Cyclo Provera
- Cyclofem
- Mesigyna

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Leave Feedback

- Contraindication of injectables

  → Progesterone only injectables

  - Undiagnosed vaginal bleeding
  - Genital malignancy of Ca cervix
  - Pregnancy

Implants 00:31:50

- Subdermal
- Commonly used in India → Norplant
  - Made of Silastic capsules
  - R_a: 2 rods (contains 35 mg LNG)

Other methods of contraception 00:34:27

- Post coital / Emergency contraception

  1. Intra Uterine Device (IUD)
     - Best and the most effective
     - Within 5 days of unprotected intercourse

  2. Levonorgestrel (LNG)
     - 1.5 mg 'Single Dose' within 72 hours

  3. Mifepristone (RU - 486)
     - 10 mg within 72 hours

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- Gossypol
  - Male contraceptive
  - Mechanism of Action: Inhibition of Spermatogenesis
  - Natural product → Chinese plant (cotton seed)
  - Side Effect: Azoospermia

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Centchroman 00:38:29

- Non Hormonal contraceptive
- Mechanism of Action: Selective Estrogen Receptor Modulator (SERM)
- It has 30 mg of Methoxychroman Hydrochloride
- Main chemical responsible for action: Ormeloxifene
- Dose: Twice weekly for 3 months, followed by once weekly till required, if a female misses a dose in more than 2 days, alternate contraception is used, followed by normal schedule
- Contraindications: PCOD
  Lactation
  Hepatic disease
  Cervical Hyperplasia
  Hypersensitivity
- Advantage: Can be used for the management of Dysfunctional uterine Bleeding
- Chhaya is the new brand name for centchroman

Natural methods of contraception 00:44:03

- Coitus interruptus (non-physiological)
- Calendar / Rhythm method
  → Cycle of Beads
  → Persona: - A digital device
  - Check Hormonal levels in the morning urine
- Abstinence (non-physiological)
- Basal body temperature – ↑ in 0.5 – 1°C during Ovulation
- Cervical mucus Thickening (Billing's Method)

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Permanent methods of contraception 00:49:24

main types

Tubectomy
- Can be done as a minilaparoscopic procedure
- Incision size: 2.5–3 cm
- Done under local anesthesia
- can be done in mass sterilisation camps / PHC / Village level

Vasectomy
- most common type: Non scalpel vasectomy (NSV)
- No hematoma
- ↓ Pain
- ↑ user friendly
- NSV in india is funded by UNFPA (United Nations Fund for Population Activities)

- Complications of Non Scalpel Vasectomy
  - Operative complications: pain, local infection
  - Hematoma
  - Sperm granules (appears 10–14 days post operation, and resolves spontaneously)
  - Spontaneous Recanalisation (0–6 % chance)
  - Auto immune response: 55% Antisperm Antibodies (No harmful effect)
- Failure rate of vasectomy: 0.15 HWY (Hundred Women Years)
- most common reasons for failure: – Operative
  – Non-compliance to post-operative advice
- People who have undergone vasectomy should use alternate contraceptions for a period of 8–9 weeks or 30 ejaculations

Other permanent methods 00:57:21

- ESSURE
  - A microfilament stent, micro essure is inserted into fallopian tube

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- Technique is called Essure Technique
- Process: A tubal blockage is created
- After 6 weeks, Hysterosalpingography is done to confirm sterilisation

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MTP ACT, FAILURE RATES, CONTRACEPTIVE OF CHOICE

MTP Act [1971] 00:00:08

- To prevent any unwanted pregnancies
- Helps the female in family planning

Why MTP [Medical Termination of Pregnancy] is done?

S – Social (Unmarried, economically deprived female)

H – Humanitarian (Rape victim)

E – Eugenic (Genetic disorders)

F – Failure of contraception

T – Therapeutic (Maternal complications)

Who can perform MTP?

Any MBBS doctor who is a Registered Medical Practitioner and has

- At least 6 months residency in Obstetrics & gynaecology
- At least 25 cases of MTP under supervision
- A degree / diploma in Obstetrics & Gynaecology

Where can MTP be performed?

Any healthcare centres with the facility to do emergency laparotomy or major gynaecologic surgeries

How to perform MTP?

< 6 weeks [Ideal MTP] ⇒ misoprostol + mife pristone

> 6 weeks ⇒ Medical or surgical methods based on the doctor's opinion

When can MTP be done?

- Usually done within 12 weeks of gestation

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Leave Feedback

-> 12 weeks to < 20 weeks: MTP is done only after consultation with a doctors consent is required

Evaluation of contraceptive methods 00:08:26

1. Effectivity of contraception:

Condoms : 50%

IUDs : 95%

OCP : 99% ⇒ most effective contraception

2. Equivalent sterilisation:

- For comparison of sterilisation rate between 2 areas

1 tubectomy → 1 sterilisation

1 vasectomy → 1 sterilisation

3 IUD user → 1 sterilisation

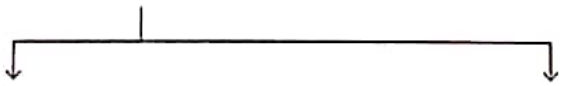
9 equivalent OCP user → 1 sterilisation

18 equivalent condom users → 1 sterilisation

Equivalent OCP user → OCP usage for a minimum of 11 months consecutively

Equivalent condom users → > 72 condoms / years

3. Failure rate: No. of accidental pregnancies



Life table analysis

Observe the females in Reproductive Age group to Analyse any accidental Pregnancies

$$= \frac{\text{No. of accidental pregnancies}}{\text{Total no. of women months of exposure}} \times 1200$$

Pearls index

$$= \frac{\text{No. of accidental pregnancies}}{\text{Total no. of women years of exposure}} \times 100$$

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Contraceptive methods 00:18:40

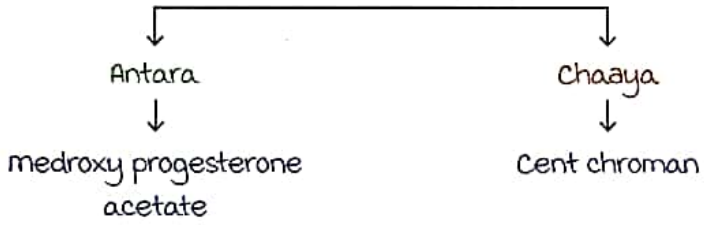
Temporary methods:

- Natural: Persona, beads, billings
- Barrier: Condoms
- OCPs : Mala-N, Mala-D
- IUD : Inhibit fertilisation > Implantation

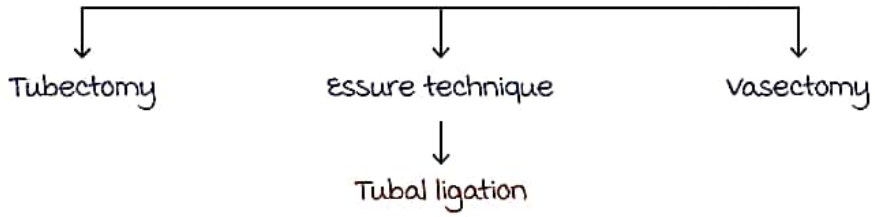
  Chances of ectopic pregnancy maximum in IIIrd generation
  Progestasert > II nd > I st

  Eg: CuT 380 A → Effective for 10 yrs

- Injectables / Implants



Permanent methods:



Contraception of choice 00:21:45

1. Unmarried female, sexually active → Barrier method > OCP
2. Married nulliparous female who wants to delay the child
   → OCP
3. Married female, mother of 1 child, wants to delay the 2nd child
   → IUD

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4. Married female, mother of 1 child, wants to delay the 2nd child but she is obese, has DM, does not
   Prefer IUD → Educated ⇒ Chaaya
   → Uneducated ⇒ Antara

5. Married female with 3 children, wants to delay the 4th child → Tubectomy > Vasectomy
   → most cost effective

Chaaya 00:26:27

Selective Estrogen Receptor Modulators (SERM)

Non steroidal

Non hormonal

Highly efficacious but high failure rate

↓

Due to non compliance

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NEWER CONTRACEPTIVE METHODS

- Newer contraceptives under Government of India

  1) Antara → medroxy Progesterone Acetate (MPA) – 150 mg for 3 months intramuscular

  2) Chhaya → Centchroman

  3) All the contraceptives under the Government of India are given a Brand Name → ASHA

Recent advances 00:02:18

Gynefix

- Newly launched IUD (Intrauterine Device)
- Rimless / Frameless IUD
- Six Copper tubes tied together with a thread and it is embedded into uterine myometrium

Advantage → Suitable for Nulliparous women

Disadvantage → Requires training and Specialised procedure } For its insertion

CatSper

- Sperm motility needs Ca^{+a}
- Gene responsible for Ca^{+a} ion channel → CatSper gene
- CatSper gene Blockers

↓

No calcium channel

↓

No calcium

↓

No sperm motility

Advantage:

- Both male & female contraceptive
- It is effective

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Drogestrel Pill

- Oral pill containing Desogestrel + Testosterone
- It blocks the sperm
- It's a male contraceptive and is 100% effective

Disadvantage:

↓

Electrolyte Imbalance

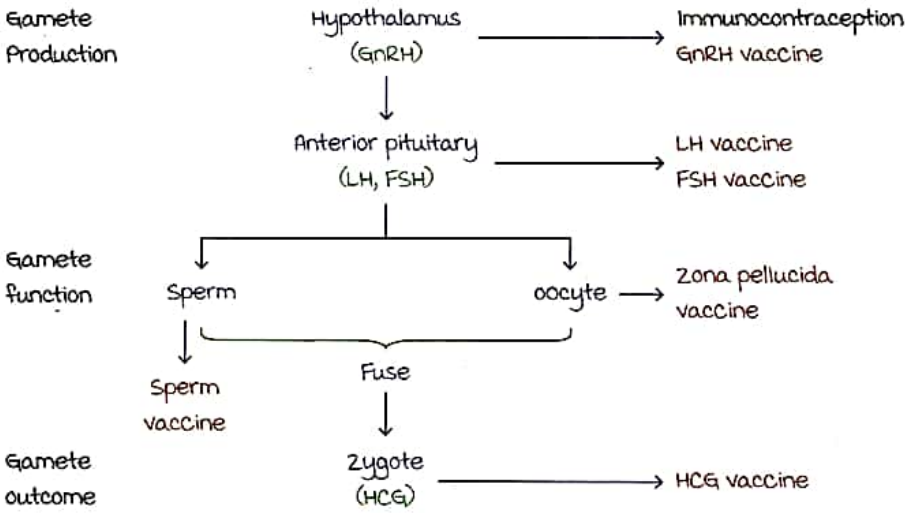
Metered Dose Transdermal System (MDTS)

- Drug → Nestorone
- Contraceptive spray in females, sprayed on forearm
- Effective even for lactating females (Breastfeeding mothers)

Adjudin

- Non Hormonal male pill
- It's an Analogue of Lonidamine (Anticancer drug)
- It inhibits Sperm maturation
- Reversibility is around 95 % within 1 year

Birth control vaccines 00:08:49



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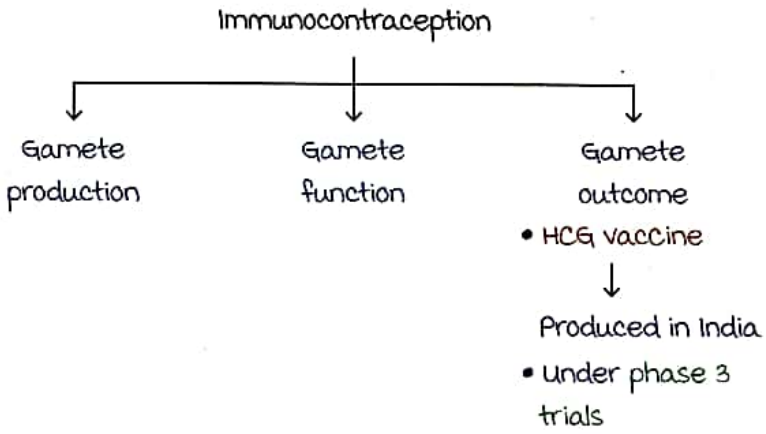

RISUG

- Reversible Inhibition of Sperm Under Guidance
- It's a Non hormonal Injectable Contraceptive

↓

SMA (Styrene Maleic Anhydride)

- On injection, it goes into the Vas deferens

↓

Causes partial blockade of Vas deferens and also destroys the sperm

Injectable silicone plugs 00:15:30

- It is for male sterilization
- There are two types

1) MPU → Medical Grade Polyurethene
2) MSR → Medical Grade Silicone Rubber

↓

When injected into Vas deferens it gets solidified and blocks the Vas deferens

↓

NO Transport of sperms

- It is done under local Anaesthesia

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Leave Feedback

FEMCON Fe

- Oral chewable contraceptive pill
- Flavoured
- It contains

  35 micrograms of Ethinyl estradiol + 0.4 mg Norethindrone

- Same as oral contraceptive pills

  21 tablets – hormonal

  7 tablets – Iron

ESSURE

- Permanent female Sterilization

Implanon

- It is a subdermal implant
- Single semirigid rod → Contains Etonorgestral secreted at the rate of 30-40 microgram / Day
- Mechanism of Action

  ↓

  It inhibits ovulation by blocking the Hypothalamo-pituitary Axis

  ↓

  Results in Anovulatory cycle

- Life span of 3 years

Gossypol

Disclaimer

- These Notes do not cover all the points, especially conceptual points, discussed in the videos. The information in this book is meant to complement Marrow videos and should be used in conjunction with the videos. Special emphasis on certain points and MCQ solving approach has to be understood from the videos only.

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NATIONAL FAMILY PLANNING PROGRAMME

The 'three' theme 00:00:16

The National Family Planning Programme has three themes:

1. Sons or daughters – 'Two will do'
2. Second child after 3 years
3. Universal immunization

Organisation 00:01:27

1. At the centre: Population advisory council
   - Includes : Secretary (MOHFW)
     Additional and joint secretaries
     Adviser (function: mass media and communication)
   - Work : Think tank for the population
     Sciences of the country
2. At the state level: State family welfare bureau
3. At the district level:
   - District health and family welfare bureau
   - Urban Family Welfare Centre:
     Type I : 10 – 25,000 population
     Type II : 25 – 50,000 population
     Type III : > 50,000 population
   - Urban Health Post: A – < 5000 population
     B – 5 – 10,000 population
     C – 10 – 25,000 population
     D – 25 – 50,000 population
4. At the village level:
   - ASHA workers
   - Trained dai
   - Village health guides

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Strategies

00:08:17

- Couple protection rate > 60%

Strategies:

1. Home delivery of contraception:

- Improve knowledge, attitude, practices
- Improve unmet needs of family planning
- Done by ASHA workers

↓

Aasha contraceptives
- Rs. 1 → 3 condoms
- Rs. 1 → 1 cycle of OCP
- Rs. 2 → Emergency contraceptive pill (Levonorgesterol 1.5 mg)

2. Ensure spacing between births

- ASHA incentive:

  Rs. 500 : Delay 1st child till 2 years post marriage

  Rs. 500 : Spacing between 2 children (> 3 years)

  Rs. 1000 : If couple gets family planning (permanent) method done after 2 or less children

- Short term IUCD – Life span of 5 years
- Post partum IUCD insertion – Done within 24 hours
- Antara
- Chhaya
- CuT 375 – multiload device

3. Pregnancy testing Kit – Nischay

  - Available with ASHA at village level

4. Mission Parivar Vikas

  - All women of reproductive age (15–49 years) registered under the mission and are provided with

    a) Free family planning services

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b) Iron folic acid supplementation

c) Deworming tablets

5. Fixed day static services

- Fixed days for conducting sterilization surgeries

↓

- At district hospitals : Twice weekly
- Sub district hospitals : weekly
- CHC / Block PHCs : Fortnightly
- PHC : monthly

6. ASHA incentives for Tubectomies / Vasectomies:

Rs 150–400

(Varies based on high focus states and procedure done)

National family indemnity scheme 00:19:58

- Insurance for sterilization

Claims arising out of sterilization operation		Amount (Rs.)
A	Death at hospital / within seven days of discharge	2,00,000
B	Death following sterilization (8th – 30th day from discharge)	50,000
C	Expenses for treatment of medial complications	25,000
D	Failure of sterilization	30,000
E	Doctors / facilities covered for litigations up to 4 cases per year including defence cost	2,00,000 (per case)

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Leave Feedbac

Family planning methods

00:21:13

Family Planning method	Service Provider	Service Location
	SPACING METHODS:	
IUD 380 A	Trained ¶ certified ANMs, LHVs, SNs and doctors	Subcenture ¶ higher levels
Oral contraceptive pills	Trained ASHAs, ANMs, LHVs, SNs and doctors	Village level subcentre ¶ higher levels
Condoms	Trained ASHAs, ANMs, LHVs, SNs and doctors	Village level subcentre ¶ higher level
	LIMITING METHOD	
Minilap	Trained ¶ certified MBBS doctors ¶ specialist Doctors	PHC ¶ higher levels
Laparoscopic sterilization	Trained ¶ certified specialist Doctors (OBG ¶ General surgeons)	Usually CHC ¶ higher levels
NSV: No scalpel vasectomy	Trained ¶ certified MBBS doctors ¶ specialist Doctors	PHC ¶ higher levels
	EMERGENCY CONTRACEPTION	
Emergency contraceptive pills (ECPs)	Trained ASHAs, ANMs, LHVs, SNs and doctors	Village level, subcentre ¶ higher levels

International voluntary organisations

00:22:58

1. International Planned Parenthood Federation (IPPF)
   - World's largest private organization Supporting family planning services in developing countries
2. United Nations Fund for Population Activities (UNFPA) – Promotes male sterilization
3. US agency for International Development (USAID)
   - Promotes temporary methods

Both UNFPA and USAID provide 100% sponsorship for the programme

4. Population council
5. Ford Foundation, the Pathfinder Fund and World Bank, besides WHO and UNICEF

Monitoring and Evaluation

00:24:19

1. Evaluation of need
   - Analyse number of eligible couples

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2. Evaluation of plans
   - Number of service locations

3. Evaluation of performance
   - Services
   - Responses
   - Cost analysis

4. Evaluation of effects
   - Knowledge, attitude and practices are studied

5. Evaluation of impact
   - Family size: most sensitive indicator
   - Desired number of children
   - Birth interval
   - Age of mother at first and last child
   - Birth order
   - Number of abortions

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INDICATORS OF MCH CARE

Maternal and child health (MCH) 00:00:17

1) Indicators of MCH Care → IMR, NNMR, SBR, PNMR

2) Preventive obstetrics → ANC, INC, PNC

3) Preventive Pediatrics

- Immediate Care of Newborn
- Breastfeeding
- Care of child
- Growth & development → Growth charts

4) Social Pediatrics

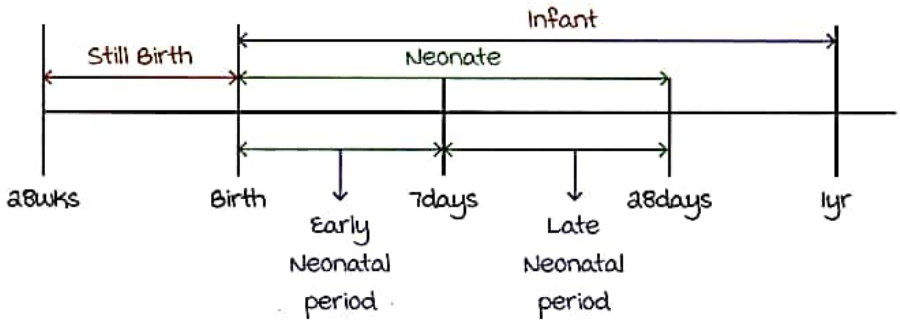
- Social Organisations
- School health services
- Child handicaps
- Child Rights

5) RMNCH + A Program

(Reproductive Maternal Neonatal Child Health + Adolescent)

Indicators of MCH care 00:05:38

- Infant Mortality Rate (IMR)
- Maternal Mortality Ratio (MMR)
- PeriNatal Mortality Rate (PNMR)
- Still Birth Rate (SBR)
- NeoNatal Mortality Rate (NNMR)
- Child Death Rate (CDR)
- Child Mortality Rate (CMR)
- Child Survival Index (CSI)



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	FORMULA	CURRENT RATE	TARGET	MOST COMMON CAUSE	REMARKS
IMR =	$\frac{\text{No. of Infant Deaths}}{\text{Total Live Births}}$ 'PKLB' ↓ Per 1000 Live Births	34 / 100 Live births	<38 by 2019 <35 by 2025 WHO → < 30 by 2030	LBW (Low Birth Weight) <2.5kg Prematurity	• Indicator for Overall development of nation • Standard indicator
NNMR=	$\frac{\text{No. of Neonatal Deaths}}{\text{Live Births}}$ PKLB	24 → ENNMR → 18 → LNNMR → 6	<16 by 2025 WHO → < 10 by 2030	Prematurity LBW	
SBR=	$\frac{\text{No. of Still births}}{\text{Live Births + Still births}}$ × 1000	4 per 1000 Total births	< 10 by 2030	maternal causes fetal causes social causes	
PNMR=	Still birth rate + Early neonatal mortality rate (or) Still birth + Early neonatal death = $\frac{\text{Live births + Still births}}{}$	23 - 23	-	-	Indicator for i) Quality of health services a) Health facility utilization
MMR=	$\frac{\text{No. of maternal death}}{\text{Live birth}}$ × 1,00,000 Live births	130 / Lakh live births	<100 by 2030 WHO: < 70 by 2030	Post partum hemorrhage - 38% i) Uterine atony 4) Anemia a) Retained products 5) Prolonged labour 3) Traumatic delivery	Indicator for quality of i) Delivery services a) material care
U5MR=	$\frac{\text{No. of under 5 children deaths}}{\text{Live births}}$ × 1000	39 / 1000 live births	< 23 by 2025	Malnutrition Respiratory infections	Best indicator for development of nation as per UNICEF

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Controversies regarding still Birth Rate

1) In Countries, where there is no Adequate Reporting System,

$$\text{Still Birth Rate} = \frac{\text{No.of Still Birth}}{\text{Live Birth}}$$

And In Countries, with Good Reporting System

↓

$$\text{Still Birth Rate} = \frac{\text{Still Birth}}{\text{Live birth} + \text{Still birth}}$$

2) Still Birth are fetal Death:

1) After 28 weeks of Gestation
2) > 1000 gm of fetal weight
3) > 35 cm of crown Rump length (CRL)

Lancet Series 2009 → Still Birth Rate - 22 (in india)

- maximum Risk of Death During Neonatal Period is 24-48 hours of life
- UNICEF → United Nations International Children Emergency Fund
- $\text{Child Death Rate} = \frac{\text{Death in 1 - 4 years of age}}{\text{Live births}}$ ~~x 1000~~ ef
  - It does not count Infant mortality Rate
- $\text{Child mortality Rate} = \frac{\text{Under 5 death}}{\text{Live births}} \times 1000$

  er 5 mortality Rate
- $\text{Child Survival index} = \frac{1000 - \text{Under 5 mortality rate}}{10}$
- LBW (Low Birth weight) Prevalance → 22-28%
- malnutrition in under - 5 children is - ≃ 40%

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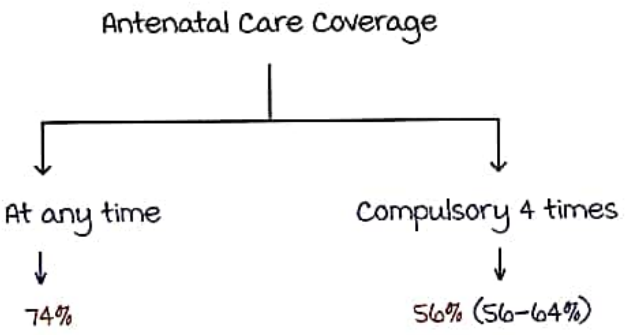

- Target Antenatal Care Coverage is >90% by 2020

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PREVENTIVE OBSTETRICS

Introduction 00:00:49

- mother & child are taken as a single unit
- because

1) Baby is within the mother for 280 days
2) Only if mother is healthy, child is healthy
3) Child is dependent on mother for 6-9 months

Preventive obstertrics

- It is of two types

Community obstetrics
- Concept of obstetrics implied on community with Primary health care

Social obstetrics
- Comprehensive mother & child healthcare

includes - Adolescent health
- Family planning
- Spacing
- Age at Marriage
- Diseases in pregnancy

Preventive Pediatrics

- It is of two Types

Preventive pediatrics
- Pediatric knowledge at PHC

Social pediatrics
- Welfare programs
- Comprehensive mother & child care

↓

eg: School health services

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AnteNatal Care (ANC)

00:05:45

- Minimum visits required in antenatal care → 4 visits

  1st visit → <12 weeks → Registration visit

  2nd visit → 14–26 weeks
  3rd visit → 28–34 weeks
  4th visit → >36 week to till term
  } ANC visits

ANC

- History, physical examination
- Check for

  Anaemia → Pallor

  Hypertension → Serial blood pressure checking

- Abdominal examination

  At 12 weeks → Uterus is just palpable per abdomen

  20 weeks → Palpable below the umbilicus

  36 weeks → Just below the xiphisternum

- Weight gain
- Total weight gain during pregnancy → 9–11 kg
- After 3rd month

  ↓

  Normal Rate of weight gain is 2kg / month

  - If it is less than or more than 2kg / month

    ↓

    Not good

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Infectious Screen :

1) At subcentre

- Rapid malaria Test (especially in malaria endemic regions)
- Urine Test for proteins & Glucose
- Check for Hemoglobin → Anaemia

↓

In Pregnant female < 11g/dl

2) At Primary health centre

- VDRL test
- HBs Ag
- HIV serology
- Malaria Testing
- Urine Test
- Hemoglobin

Gestational diabetes mellitus (GDM) screening 00:11:25

- GDM screening is done → < 12 weeks
- Using Oral Glucose Tolerance Test (OGTT)
  - 75gm glucose
  - Two step testing

↓

measure Blood sugar

- >140mg / dl → GDM
- <140mg / dl → Pregnancy continues and Repeat OGTT done from 24 – 28 weeks
  - >140mg / dl → GDM
  - <140mg / dl → Pregnancy continues

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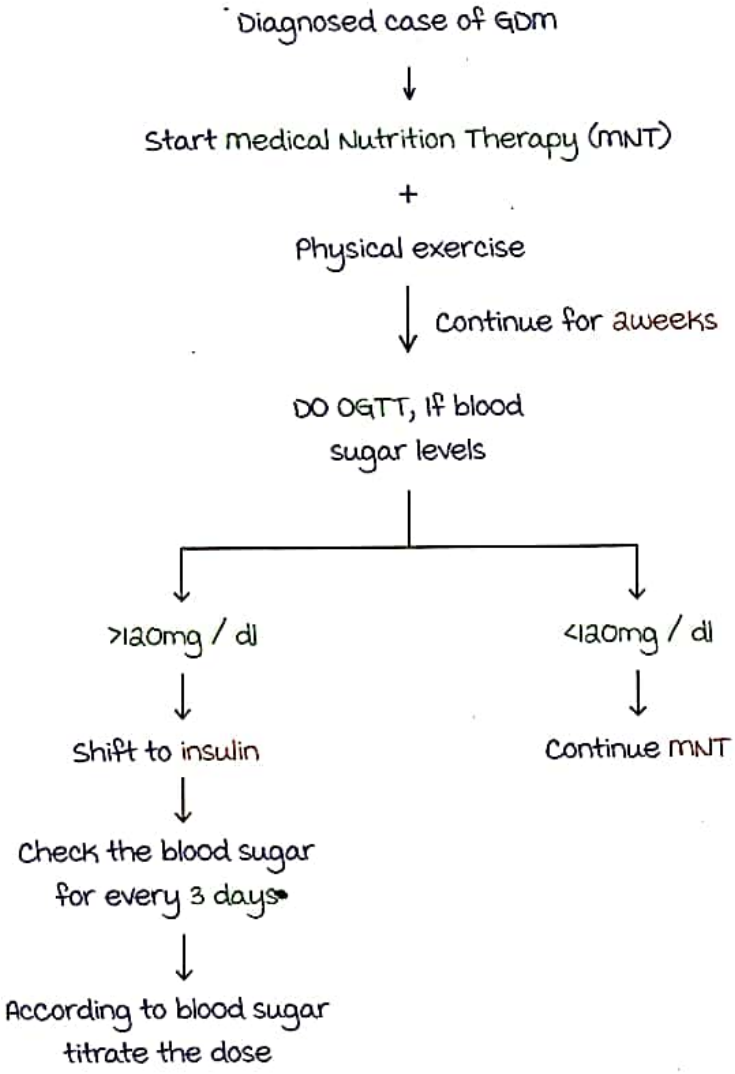

Diet:

- mother needs more calories, fat and Protein
- Total Dietary requirement → >60,000 cal Per Pregnancy

TT (Tetanus Toxoid)

- 1st dose → Given as soon as possible
- 2nd dose → Preferrably 3 weeks before delivery

  Ideal Gap between 1st & 2nd dose is 4wks

- If complete immunisation taken within previous 3years → Then, Only one TT dose is given

IFA (Iron & Folic Acid)

- 60 mg of Iron + 500 microgram of Folic Acid
- Given for 6 months Before and After Delivery

Scanned with CamScanner

Deworming

- Single dose of Albendazole- 400mg given preferably in 2nd Trimester

Calcium Supplementation

- Calcium - 500mg BD

Intranatal care 00:21:23

- Care taken during delivery for Safe delivery
- For Safe delivery
    1) Conducted by Trained personnel - Trained dai
    2) Disposable Delivery Kit (DDT)
    3) Institutional Delivery

Clean delivery

- Consists of five Basic cleans → Elements present in Disposable Delivery Kit

1) Clean Surface → Plastic sheet
2) Clean Cord → Gauze piece
3) Clean hands → Soap
4) Clean Cut → Blade
5) Clean Tie → Thread
6) Clean Water
7) Clean Towel

Rooming in:

- It means the Crib / Cradle of the Baby Should be Close to mother
- It Promotes
    - Emotional Bonding
    - Breast feeding

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Postnatal care

00:25:50

- Post-natal care takes care of
  1) Diet
  2) Emotional Support
  3) Hygiene
  4) Prevention of Any Disease

Post Natal Care

WHO guidelines

- Early PNC
  1) Twice daily → For 1st 3 days after delivery
  2) Once daily till cord drops off
- Late / maintained PNC
  ↓
  Once / month in 1st 6 months
  ↓
  Once / 2-3 months in next 6 months

Indian guidelines

- PNC is done by mPW (Female) or ANM or Trained health professional On day 1, 3, 7, 42
- In case if baby is Low Birth Weight
  ↓
  Done on Day 1, 3, 7, 14, 21, 28, 42

- Most common Cause Death / Morbidity during Post Natal Care

1) Hemorrhage → 38% of Maternal Mortality
   → Secondary hemorrhage Occurs between 6 hours to 6 weeks

2) Puerperal Sepsis → Most commonly occurs in <3 weeks

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PREVENTIVE PEDIATRICS

Breastfeeding 00:01:28

- Exclusive breast feeding → For 6 months
- Advantages:
  - Safe, affordable, readily available
  - Considered as living fluid → Complete diet for the baby
  - High amount of immunoglobulins → Anti-infective properties
- Average breastfeed in a female: 400-600 ml / day
  Maximum breastfeed: between 5th – 7th month
  (~730 ml / day – around 6th month)
- Classification:
  a) Colostrum: Produced between 0-3 days post delivery
  : High amount of IgG and IgA present
  b) Mature milk: Produced after 12-14 days
  : Considered as the complete diet
- Health schemes promoting breast feeding:

1. BFHI – Baby friendly hospital initiative
   - Launched by UNICEF / WHO
   - All BFHI hospitals are to comply to the 10 guidelines of the initiative

2. MAA – Mother's Absolute Affection
   - Aims to promote breastfeeding in the hospitals
   - Breastfeeding to be initiated:
     - Within 1 hour – In normal deliveries
     - Within 4 hours – In cesarean section

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3. Milk substitutes, Infant food and feeding bottles prohibition Act 1992
   - IYCF (Infant and Young Child Feeding Act)
     - Ban on promotion of milk substitutes, infant foods and feeding bottles

Immediate newborn care 00:09:02

- Infant mortality rate → 34
- Neonatal mortality rate → 24
- Early neonatal mortality rate → 18

* Out of 34 infant deaths, 18 deaths occur in the early neonatal period (~50 %) and 1/3rd die within 2 days of birth

Components of immediate newborn care:

1. Clean airways
2. Eyes: Sterile swab and water used to clean eyes
3. APGAR scoring
4. Cord care: Cut the cord after the pulsations stop. This provides additional 10ml of blood to the baby
5. First bath:
   - After 6th day
6. Hypothermia

   To maintain body temperature: Maintain warm chain (cover baby adequately)
7. Weight to be measured: Immediately (for institutional deliveries)
   - In home deliveries: within 1 hour

- Weight measured using Salter scale (available in anganwadi)

or

home weighing scales

8. Length: measured within 3days
   Head and chest circumference: within 3 days

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At risk babies:

a) Birth order > 5
b) Weight < 2.5 kg
c) Twins
d) Protein – energy malnutrition, diarrhea, malnutrition
e) Weight percentile < 70 %
f) Working mothers

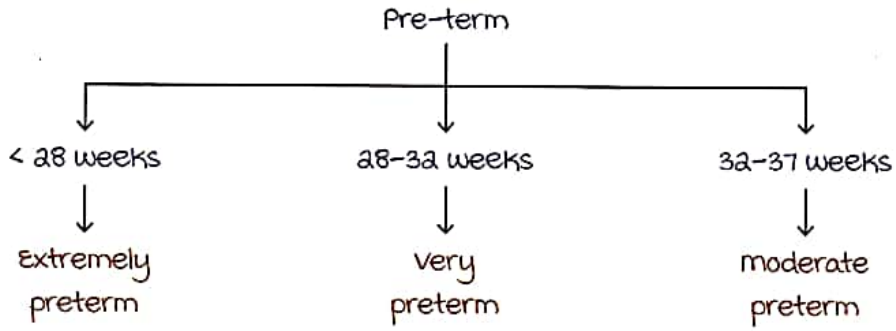
Definitions

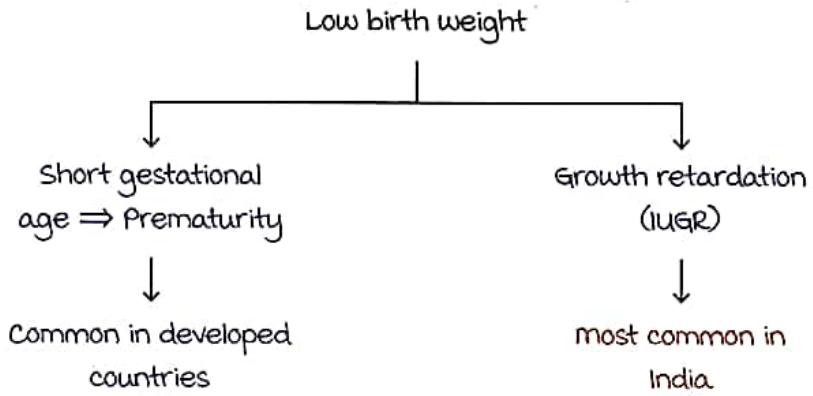
00:20:28

1. Pre-term: < 37 weeks of gestation (or)
   < 259 days

2. Term: 37-42 weeks or 259-293 days

3. Post term: > 42 wks or > 294 days





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Kangaroo mother care:

Advantages: (SANS)

1) Skin to skin contact between mother and child → maintains body temperature

2) Ambulatory support

3) Nutritional support

4) Emotional support

Assessment of growth & development 00:25:03

- most important indicator for malnutrition:

  mid-arm circumference – measured using Shakir's tape

mid-upper arm circumference (MUAC)

- measured in children aged 1 year – 59 months

(Exception: Can be done in age > 6 months, if height > 65 cms)

- Left arm used preferentially
- measured at the mid-point of acromion and olecranon

Criteria for mid-arm circumference

1. WHO / UNICEF criteria:

- Revised criteria: < 11.5 → Malnutrition [Red zone]
  11.5–12.5 → At risk of malnutrition [yellow zone]
  > 12.5 → Normal [Green zone]

2. New Shakir tape: used in private sector (S0145620)

- Has 4 zones
- < 11 cm : Severe acute malnutrition
  11–12.5 : Moderate acute malnutrition (Orange color category)
  12.5–13.5 : At risk of malnutrition (yellow zone)
  > 13.5 cm : Normal

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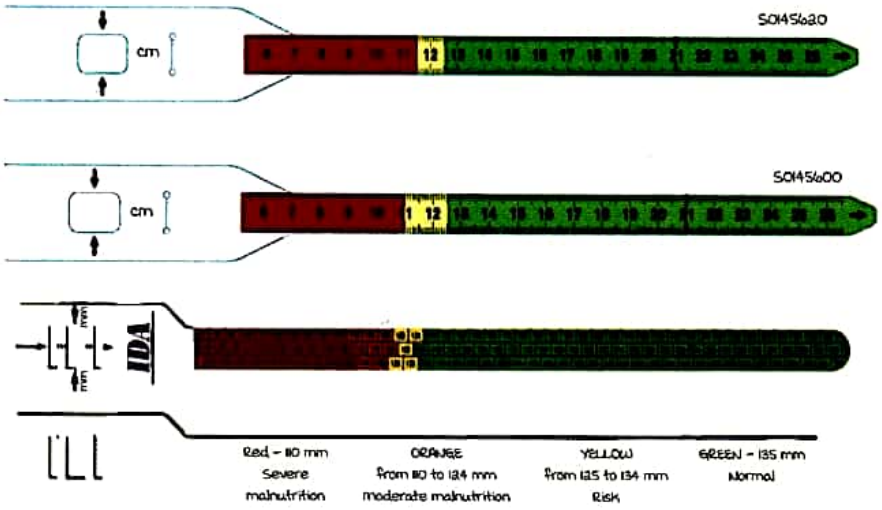
Public sector (ASHA workers, ICDS) uses the three zones of Shakir tape [Yellow zone → New]



New Shakir's tape:

New → Orange zone: 11–12.5 cm → Moderate acute malnutrition

Yellow zone : 12.5–13.5cm → At risk

Malnutrition indicators 00:37:33

	Acute malnutrition	Chronic malnutrition
Weight for age (WFA)	↓	↓
Weight for height (WFH)	↓	Both weight & height are decreased [Apparently normal]
Height for age (HFA)	Normal	↓

* Best marker for acute malnutrition: weight for height
* Best marker for chronic malnutrition: Height for age
* most sensitive criteria for malnutrition: weight for age

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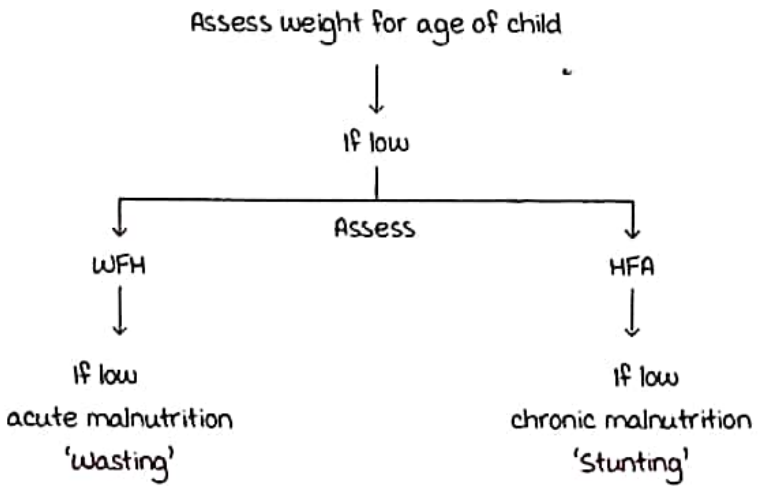
Leave Feedbac

Classification:



1. Gomez classification:
   - Based on weight for age
   - < 80% expected weight → Low Gomez

2. Waterlows classification:
   - Based on weight for height & height for age
   - Can classify children into wasted and stunted groups
   - < -2SD WFH → Wasting
   - < -2SD HFA → Stunting

3. Welcome trust classification:
   - In protein-energy malnutrition or edema

Growth charts

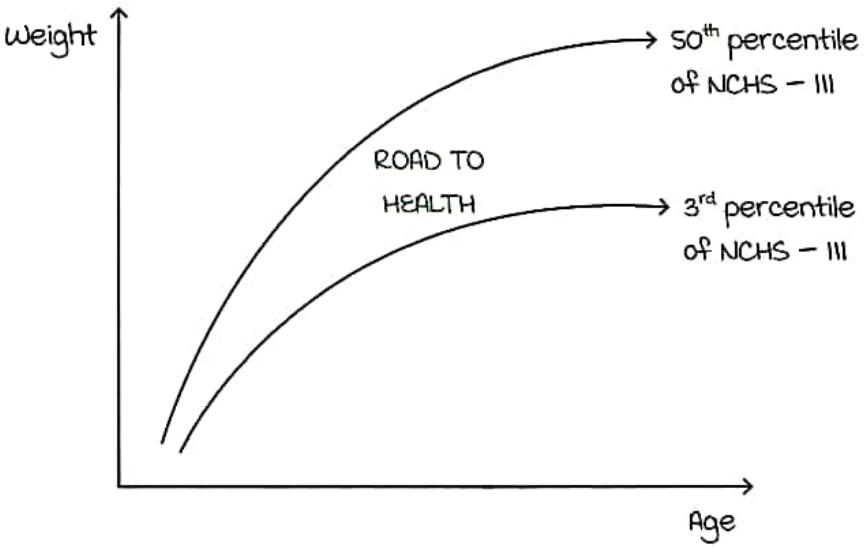
00:45:11

- Invented by David Morley
- Weight for age charts
- Uses:
  a) Helps in health education
  b) Helps in growth assessment → Trend of growth is assessed
  c) Tool for action → Public health policies can be made based on growth charts

Types of growth charts:

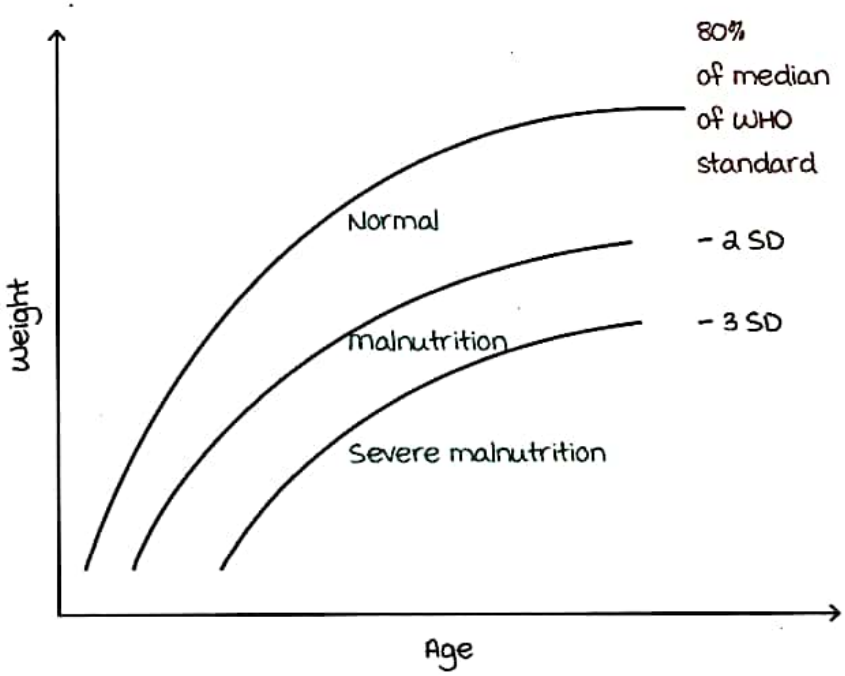
1. WHO growth charts:
   - Also called field growth chart

Scanned with CamScanner



* NCHS – National commission of health survey
  - Also called Boston standards
  - Between 3rd and 50th percentile → Green zone → Normally growing child
  - > 50th percentile: Obese
    < 3rd percentile : Malnutrition

2. ICDS growth chart:
   - Based on WHO standard for child growth (2006) based on the Multicentric Growth Reference Study (MGRS)



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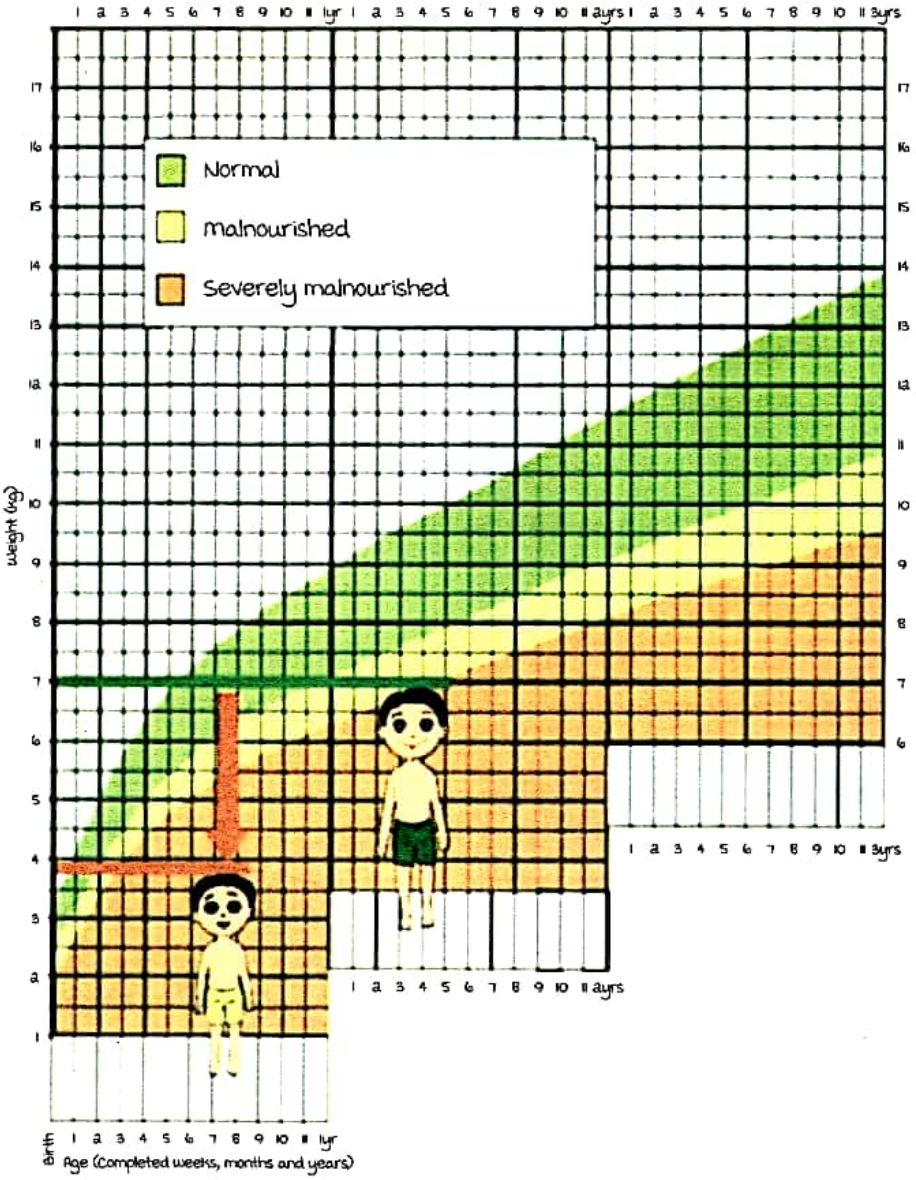
Note:

80 % of median of WHO standard corresponds to 80 % of the 50th percentile of WHO field growth charts

- Between 80 % of median and − 2 SD
  → Normal (green zone)
- − 2 SD to − 3 SD → malnutrition (yellow)
- < − 3 SD → Severe malnutrition (red zone)



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SOCIAL PEDIATRICS

Child health problems 00:00:41

1. Low Birth weight: Growth retardation

2. Malnutrition: → Protein energy malnutrition
   → Micro nutrient deficiency
   → Hidden hunger

Hidden Hunger:
- MCC – Iron deficiency
- Vit A deficiency
- Iodine
- Zinc

3. Infections: Respiratory > Diarrheal

4. Accidents / fall

5. Behavioural – emotional Problems

Child rights 00:02:55

Article 24 – No employment of children of age < 14 years

Article 39 – Tender Age children should be given appropriate work – to prevent child abuse

Article 45 – Free Primary, elementary education to all children of age < 14 years

Child Handicap:

- Physical → Loss of a part of the Body
- Mental → Based on IQ
  - 50–70 = Mild MR
  - 35–50 = Moderate MR
  - 20–35 = Severe MR
  - < 20 = Profound MR

Scanned with CamScanner

Battered baby syndrome 00:07:11

- Seen in children < 3 yr, due to non accidental, Inexcusable act of violence or injury or trauma; By a person in authority / trust

In terms of – • Affection (emotional)
• Care (Health / medical care)
• Nutrition

Child placement services 00:09:46

Social organizations – For child displaced from home / doesn't have home

Orphanages – Parents not alive / cannot support child

Foster homes – Temporary child living with extended family members / Relatives

Adoption – New parent; Not a biological parent of the Children

Borstal – For children > 16 yrs who are difficult to handle in schools

Remand homes – Correction homes for children who have been sentenced for punishment
It will have Psychiatrist, Psychologist & medical doctor

School health services 00:12:39

Essential features: • Nutritional Services
• Eye care
• Mental Health
• Dental Health
• Health Education

Healthful living in a school:

1) Size of school → Primary = > 5 acres
→ Higher secondary = > 10 acres

& Plus 1 acre / 100 children in the school

Scanned with CamScanner

2) Nearby Play ground
3) Exterior wall of school – > 10 inch thick
4) Not > 40 students per classroom
5) Space – Not < 10 sq.ft / child in classroom (Sitting Area)
6) Desk – minus type
7) Doors & Windows – > 25 % of floor area
8) Ventilation – Not < 2 % of floor area
9) Window atleast 2½ feet above floor level
10) Color of wall – white washed (Annually)
11) Light – From left side
12) 1 Urinal for 60 students; 1 Latrine for 100 students
13) Food / Canteen – School approved vendor

Also: Annual Medical checkup

- Eye – Night Blindness, Bitot spots
- Dental Caries
- Any mental health problem

Scanned with CamScanner

Scanned with CamScanner

RMNCH + A – I

- RCH – I (Reproductive and child health): Launched on 15th Oct 1997
- RCH – II : Launched in 2005
  : Focused on maternal and child health care + Family planning
- RMNCH + A:

Launched in 2013

R – Reproductive

M – Maternal

N – Neonatal

C – Child

H – Health

+

A – Adolescent

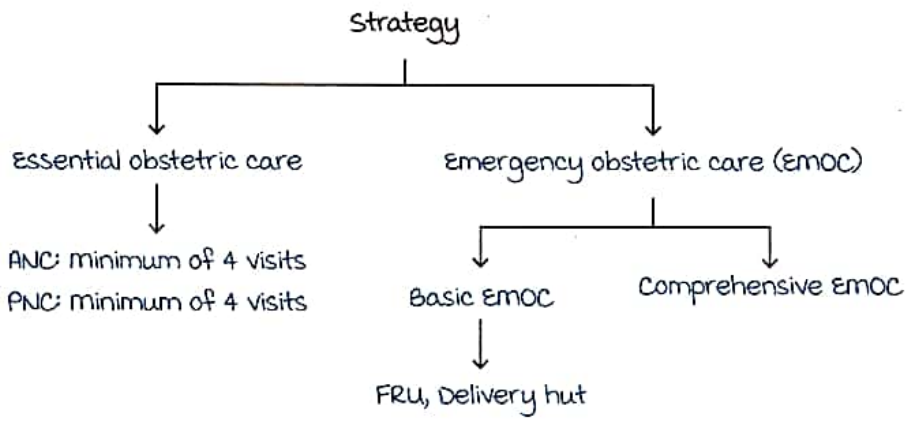
Also known as 5x5 matrix

Main Focus: Adolescence

Lifelong package for females

Strategy of RMNCH+A

00:07:12



Delivery Hut:

- Present in all delivery points in the country (Village, sub-centre, primary health care)

Scanned with CamScanner

Leave Feedbac

- Provides basic emergency obstetric and neonatal care
- Facilitates: Safe delivery
- Incharge: ASHA worker / ANM (Auxiliary Nurse midwife), MPW -F (Multi purpose health worker – Female)
- Promotes : Institutional delivery / Safe delivery
  : Birth immunization (Hep-B (o), BCG, OPV)
  : Birth records
- Provides: Delivery table, disposable delivery kits, Neonatal care

FRU, EAG

00:12:56

(i) First Referral Unit (FRU):

- FRU is an upgraded CHC (Community Health Centre)
- Main facility: Obstetrician, anaesthetist, blood bank
- Promotes : Post natal care
  : ↓ / Prevents post partum hemorrhage (PPH)
  : Safe emergency procedures to a mother in labour
- Generally, CHC must have an Obstetrician, Ophthalmologist, Anaesthetist, Surgeon, Physician

(ii) Empowered Action Group (EAG) committee:

- States under EAG: Primary states – Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh
  : Chhattisgarh, Orissa, Jharkhand, Uttarakhand
- Based on family planning and MCH indicators:
  - Low Performing States (LPS)
  - High Performing States (HPS)

JSY and JSSK

00:18:40

(i) Janani Suraksha Yojana (JSY)

- Objective: To promote institutional delivery
- Strategy: Incentive based scheme (Central Government provides incentives)

Scanned with CamScanner

	Rural		Urban	
	Mother	Asha worker	Mother	Asha worker
(i) LPS	1400	600	1000	400
(ii) HPS	700	600	600	400

(ii) Janani Shishu Suraksha Karyakaram (JSSK)

- Objective: To promote utilization of public health facility
- Strategy: Free – OPD, IPD, investigations, treatment, transport, food
- Beneficiary: Sick pregnant women
  : Sick child (< 1yr)

INAP, HBNC

00:23:12

(i) India Newborn Action Plan (INAP)

- Target (based on lancet series): To ↓ NMR (Neonatal Mortality Rate) and ↓ still birth rate to Less than 10 by 2030

(ii) Home Based Neonatal Care (HBNC)

- House to house visit by ASHA worker
- ASHA worker
  - Visits the house of mothers who underwent:
    - Normal delivery: 6 visits
    - Cesarean delivery: 5 visits
    - Home delivery: 7 visits
  - Promotes: Breastfeeding, immunization of child
  - Weighs the child: 6 times at regular intervals
  - Care provided to the child for the initial 42 days (Since, neonatal mortality rate is high in the initial 42 days)
- In the end, ASHA worker is provided an incentive of Rs. 250

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Scanned with CamScanner

RMNCH + A - II

FBNC

00:00:12

- Facility Based Neonatal care
- NCC (Newborn care corner)
  - Located at all delivery points (in the labor room)
  - Has warmers and Basic resuscitation kits
- NBSU (New Born Stabilisation Unit)
  - There is Doctor
  - Advanced new born resuscitation kit
  - Near / adjacent to labor room
- SNCU (Specialised Newborn Care Unit)
  - 10-12 bedded
  - Each bed: 100 sq.ft
  - Admission criteria → Upgradation criteria:

1. < 36.5°C	6. Convulsions
2. Cyanosis	7. Bleeding
3. Respiratory Distress	8. Weight < 1800 g
4. Severe jaundice	9. Major congenital malformation
5. Severe pallor	

  - When few conditions resolve, patient can be shifted from SNCU to NBSU (Downgradation Criteria)

RBSK

00:06:07

- Rashtriya Bal Swasthya Karyakram
- 0-18 year old
- 4 D's: Diseases, Defects, Deficiencies and Developmental delays

Scanned with CamScanner

RBSK diseases

DEFECTS 1. Neural tube defect 2. Down's Syndrome 3. Cleft Lip & Palate / Cleft palate alone 4. Talipes (club foot) 5. Developmental dysplasia of the hip 6. Congenital cataract 7. Congenital deafness 8. Congenital heart diseases 9. Retinopathy of Prematurity	DEVELOPMENTAL DELAYS 15. Vision Impairment 16. Hearing Impairment 17. Neuro-motor Impairment 18. motor delay 19. Cognitive delay 20. Language delay 21. Behaviour disorder (Autism) 22. Learning disorder 23. Attention deficit hyperactivity disorder
DEFICIENCIES 10. Anaemia especially Severe anaemia 11. Vitamin A deficiency (Bitot spot) 12. Vitamin D Deficiency, (Rickets) 13. Severe Acute Malnutrition 14. Goiter	DISEASES OF CHILDHOOD 24. Skin conditions (Scabies, fungal infection and Eczema) 25. Otitis media 26. Rheumatic heart disease 27. Reactive airway disease 28. Dental conditions 29. Convulsive disorders

RKSK

00:08:33

- Rashtriya Kishore Swasthya Karyakram
- 10-19 year old (boys and girls)
- 7 C's:
  1. Clinics
  2. Counseling
  3. Content
  4. Communication
  5. Convergence
  6. Care (Health)
  7. Community
- Peer to peer strategy ('Saathiya')

ARSH

00:11:13

- Adolescent Reproductive and Sexual Health
- Strategies:
  - → menstrual hygiene to females
  - → Sex education
  - → Prevention of reproductive Tract infections / Sexually Transmitted infections
  - → Provide weekly Iron Folic acid supplements:
    - Iron → at 60 mcg
    - Folic Acid → at 500 mg
  - → It is Blue in colour (Pregnant women are given the same, but red in colour)

Scanned with CamScanner

- The clinics under this programme are called as AFHC (Adolescent Friendly Health Clinic)

NRC

00:14:42

- Nutritional Rehabilitation centers
- For severe acute malnourished children
- 24 hour monitoring
- Treatment of all medical conditions
- Therapeutic feeding
- Sensory stimulation and emotional care
- Counselling and support

- Therapeutic Nutrition:

  1. Stabilisation Phase
     - 1-2 days
     - Starter's Diet (↑ energy, ↑ fat)

  2. Transition Phase
     - 2-6 days
     - Catchup Diet (↑ energy, ↑ Protein)

  3. Rehabilitation Phase
     - Follow up phase
     - Normal feed (Home based)

- Follow ups:
  - Weekly x 1 month
  - Fortnightly x from the time of discharge

- Micronutrient supplement

  Vit A
  - On Day 1, 2, 14
  - < 6 months → At 50,000 Iu
  - 6 months-1 year → At 100,000 Iu
  - > 1 year → At 200,000 Iu

Folic Acid

- At 5 mg on Day 1 followed by 1mg / day till time of discharge

Zn, Cu are given

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Leave Feedbac

Laqshya 00:21:11

- Program for labour room quality improvement
- ↑ Devices
- Hygiene
- ↑ Instruments
- Trained Health personnels

ICDS 00:22:13

- Integrated Child Development Scheme
- Under the ministry of women and child development
- At grassroot levels: Anganwadi
  - Family planning
  - Supplementary Nutrition
  - Health care
  - Vitamin A prophylaxis
  - Non-formal education

IMNCI 00:23:43

- Integrated management of Neonatal and childhood illness
- Integration of Health care Professionals → Anganwadi workers, MPW, Lab workers, ASHA
- For the ease of assessment L A C T was formulated

  ↙ ↓ ↓ ↘

  Look Assess Classify Treat

- Coloured charts used (to classify the child after assessment)

  Upper → Pink : Treatment + urgent referral

  Middle → Yellow : Treatment + follow up

  Lower → Green : Home based

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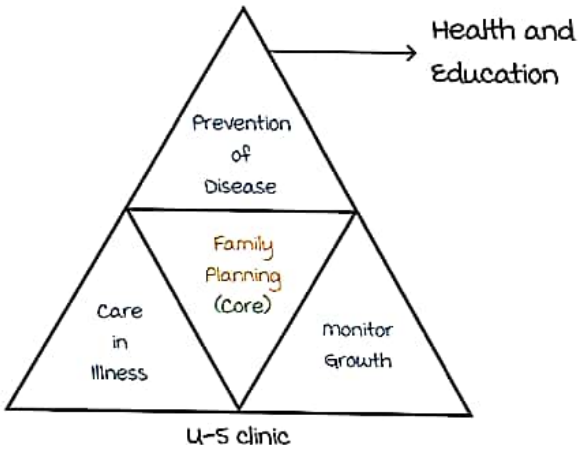
Under 5 clinic

00:28:33

- Has 5 components



MAA

00:30:28

- Mother's Absolute Affection
- To promote Breast feeding

Miscellaneous programs

00:30:56

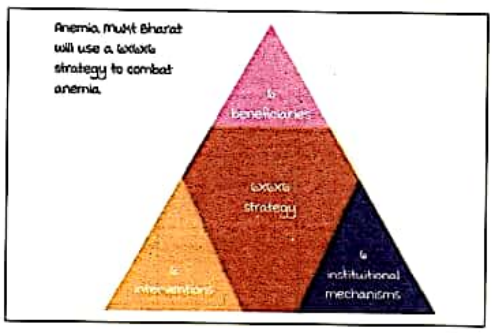
- Vande mataram scheme
- Yashoda scheme
- Mamta scheme

} ↑ Safe deliveries, ↑ Institutional deliveries (state level programs)

Anemia mukt bharat

00:32:21

- Launched in 2018
- Ministry of Health and Family Welfare (MOHFW) in association with other ministries (Nutrition, Human Resource / women and child care)



Beneficiaries:

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Interventions:

1. Prophylactic Iron Folic Acid supplementation
2. Deworming
3. 'Solid Body, Smart Mind Campaign' (Behavioural Change communication)
4. Testing of anemia at the point of care (Field Hb Testing Kits)
5. mandatory provision for fortified foods
6. Assess Non-nutritional causes of anemia
   - → Hemoglobinopathies
   - → Malaria
   - → Kala azar
   - → Fluorosis

Iron folic acid supplementation guidelines 00:38:48

	Iron	Folic Acid	Time
1. Child (6 months – 59 months)	20 mg	100mcg	Biweekly (liquid)
2. Child (5–9 years)	45 mg	400mcg	weekly
3. Adolescents (10–19 years) → ♂ (school)	60 mg	500mcg	weekly
3. Adolescents (10–19 years) → ♀ (all)	60 mg	500mcg	weekly
4. WRA (20 / 49 years)	60 mg	500mcg	weekly
5. Pregnant and Lactating female	60 mg	500mcg	Daily, 6 months before + 6 months after delivery

Scanned with CamScanner

- WRA (Women of Reproductive Age Group)
  - Female under Mission Parivar Vikas (Family Planning)
  - 20–49 years

- Adolescent children
  - 10–19 years
  - ♂ → School going
  - ♀ → In school / Out of school

Deworming guidelines

00:45:07

1. Child (12 months– 59 months)
   - 1–2 years: 200 mg
   - > 2 years: 400 mg

   } Albendazole (Biannual)
2. Child (5–9 years) → 400 mg Albendazole (Biannual)
3. Adolescent (school going)
   - ♂ 400 mg Albendazole (Biannual)
   - ♀ 400mg Albendazole (biannual)
4. WRA → 400 mg Albendazole (Biannual)
5. Pregnant and Lactating → Single dose 400 mg Albendazole (in 2nd Trimester)

Scanned with CamScanner

Scanned with CamScanner

MCH RELATED SCHEMES AND POLICIES

MCH scoring indicators 00:00:28

- HMIS
  - Health management and information system
  - Digitalisation of Health system

- Indicators under MCH score cards:
  1. Fertility
  2. Mortality
  3. Nutritional
  4. Immunisation coverage Rates
  5. Pneumonia / Diarrhoea rates
  6. Service Delivery Rates

- For all mortality, nutrition and fertility indicators:
  - Green : Less than 20% of national average
  - Yellow : Within 20% below or above the national average
  - Red : more than 20% of the national average

- All other indicators:
  - Green : > 20% of national average
  - Yellow : Within 20% below and above the average
  - Red : Less than 20% of the national average

Lactation management centres 00:03:10

- Types of centres:

- Comprehensive Lactation Management centre (CLMC)
  → where donor breast milk can be collected → medical college / District Hospital

- Lactation Management centres (LMC)
  → At District Hospitals

- Lactation Support units (LSU)
  → At all delivery units

Scanned with CamScanner

Leave Feedback

Nutritional rehabilitation centres 00:05:51

- Started in 2018 / 19
- 24 hours monitoring for severely acute malnourished children
- Medical care of complications
- Therapeutic feed
- ↑ Sensory stimulation and emotional care
- ↑ Counselling and assessment of risk factors

- Feed types and Phases
  1. Stabilisation Phase → Starter feed (↑ Energy + ↑ Protein)
  2. Transition phase → Catch up feed (Protein + fat)
  3. Rehabilitation Phase → Home feed

- Micronutrients given by NRCs:
- Vitamin A → < 6 months at 50,000 IU
  → 6 months – 1 year at 1 lakh IU
  → 1 year – 5 years at 2 lakh IU
- Folic Acid → 5 mg on Day 1 and 1 mg/day
- Zinc → 2 mg/kg/day
- Copper → 0.3 mg/ kg/day

MAA 00:10:21

- Mothers Absolute Affection → Promote breast feeding in India
- UNICEF → Baby Friendly Hospital Initiative to promote breast feeding

- Start breast feeding within < 1 h
- Exclusive breast feeding → At le
  till 2 years

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Laqshya 00:12:31

- Labour room quality improvement initiative:
  - Standard operating protocol (SOP)
  - Equipments and devices
  - Sterilisation and disinfection

- Promote management of complication before referral
- Critical care for obstetric / Gynecological complications → At medical college / District Hospital level

Infant milk substitutes act, 1992 00:15:29

- Prohibits the advertisement for infant
  - Feeding bottles
  - Milk substitutes
  - Infant formulas
- Promotes breast feeding

Child death review 00:16:36

- Added under National Health Mission
- ASHA worker should report within 48 hours, the probable cause of death of any child < 5 years

PM surakshit matritva abhiyan 00:17:37

- Prime minister's safe motherhood project
- Free antenatal care check up on 9th of every month, available at all health care facilities
- 26 weeks of maternity leave

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IMMUNITY AND VACCINES

Immunity

00:00:27

- 2 Types:

→ Active immunity

1° immune response	2° immune response
- Immediate immune response	- Occurs following 1° immune response, when exposed to the same Ag
- Latent period: 3-10 days	- Shorter latent period
- IgM, IgG	- Antibody is rapid and abundant
- memory cells produced	

→ Passive immunity

- Readymade antibodies
- Immediate, rapid immunity
- Temporary
- No immunological memory
- Passive immunisation done in:
  - Diphtheria: 500-1000 IU Diphtheria antitox
  - Tetanus: 250 IU after trauma
  - Gas gangrene : toxoids given for suspected exposure to clostridia spore
    - → Clostridium perfringens
    - → Clostridium welchii
    - → Clostridium septicum
  - Rabies: Antirabies serum

    20 IU/Kg Body weight → Human anti – rabies serum

    40 IU/Kg Body weight → Equine Anti – rabies serum
  - Botulism: 10,000 IU of polyvalent antitoxin

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Vaccine

00:06:22

- Father of Vaccination: Edward Jenner (small pox)

Live Vaccine

- Live viral vaccines:
  - Measles, Mumps, Rubella
  - Oral polio Vaccine (Sabin)
  - Yellow fever
  - Japanese Encephalitis (SA-14-14-2)
  - Varicella chicken pox
  - Rotavirus
- Live bacterial vaccines:
  - BCG
  - Oral typhoid
- From Rickettsia:
  - Epidemic typhus
- Contraindications
  - Cannot be given in immunodeficiency diseases, leukemias, malignancies, HIV, patients on long term steroid therapy
  - Pregnancy

Killed vaccine

- Less efficacious than live vaccines
- Require 2-3 primary doses to produce adequate antibody response
- Less Contraindications
- Killed viral vaccines :
  - Polio → IPV (salk)
  - Kyasanur Forest Disease (KFD)
  - Influenza
  - Hepatitis B
  - Japanese Encephalitis
  - Rabies
- Killed Bacterial vaccines:
  - pertussis
  - Typhoid
  - Cholera
  - Meningococcal

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Sub unit vaccine

- Extracted cellular fractions
- Types:
  - Toxoids: – Diphtheria
    – Tetanus
    – Anthrax
  - Proteins: – influenza vaccine
    – Acellular pertussis
  - Recombinant: Antigen is represented on yeast cells, E. coli
    – Hepatitis B vaccine
    – Human Papilloma virus vaccine
    – Cholera toxin B

Polysaccharide Vaccine

- Antibody production is against the capsular polysaccharide of the bacteria
- Serotype specific
- Eg: H i B
  Meningococcal
  Pneumococcal

Conjugate vaccine

- Polysaccharide is linked to a protein, recognised by T- cell
- Disadvantage: Serotype specific
- Advantage: Can be given to <2 years of age

Mixed formulation

- MMR, MMRV (V → Varicella)
- DPT, DTaP (aP → Acellular pertussis), Td – Tetanus and diphtheria
- Pentavalent (DPT + H i B + Hepatitis B)

Freeze Dried vaccine

- Power form
- Disadvantage: • Reconstitute
  • Risk of contamination (used within 2-6 hours)

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Leave Feedback

- Eg: BCG → used within 4 hours
  Measles → used within 4 hours
  Japanese Encephalitis → used within 2 hours
  Yellow Fever → used within ½ an hour

Immunoglobulins 00:19:06

- Passive immunity

Human Immunoglobulins
- Hepatitis A, Measles, Rabies, Tetanus, Mumps
- Hepatitis B, Diphtheria, varicella

Non – human Immunoglobulins
- Diphtheria, Rabies, Tetanus, clostridia (Gas gangrene)

Vaccine constituents 00:20:50

1. Adjuvant
- Added to vaccine
- Boosts the immune response
- Eg: ASO 1 → Malaria
  ASO 4 → HBV, HPV
  Alum → DPT, Meningococcal, HPV, Tetanus, pneumococcal

2. Excipients
- Inert substances
- Used in manufacture of vaccine

3. stabilisers
- Inert substance
- Inhibit chemical reaction and prevents vaccine degradation
- Eg: Lactose, sucrose, Amino acids, Gelatin, Albumin

4. Preservatives
- Inert substance
- No immunological action

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- Prevent contamination of vaccine
- Prolong the shelf life
- Eg: phenoxy ethanol
  Phenol
  Thiomersal

5. Buffers
- Neutralise the effect of PH
- Eg: JE → phosphate buffer
  Cholera → Gastric buffer
- MC used buffering agent: sodium chloride

6. Diluents
- Liquid to dilute the vaccine
- Eg: Measles → Distilled water
  BCG → Normal saline
  JE → Phosphate buffer

7. Surfactant (Emulsifiers)
- ↓ surface tension
- Eg: BCG
  Tuberculin Test → Purified protein derivative with Tween 80 (polysorbate)

8. Antibiotics
- MC used: Neomycin → Varicella, Measles, influenza, MMR, DPT
- Gentamycin → Influenza
- Erythromycin → Measles
- Streptomycin + Neomycin → IPV

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NIS AND MISSION INDRADHANUSH

Mission Indradhanush (National Immunization Schedule) 00:01:25

- 1978 : Expanded program for immunization
  - DPT , BCG , measles , OPV
- 1985 : Universal Immunisation Program (UIP)
  - measles immunization was strengthened
- -Total of 6 vaccine preventable diseases were considered .
- 1992 : Pulse polio Immunization was strengthened
- 2014 : Mission Indradhanush
  - Indradhanush : meaning " rainbow " (7 colours)
    : Focusing 7 vaccine preventable diseases
    : Hep B + DPT , BCG , measles , OPV .
    : Children under 5 yrs should have 7 immunization visits

Vaccines Under NIS 00:06:25

Age	Regular Vaccines	Newer vaccines
Birth	BCG , OPV , Hep B : 0 dose	
6,10,14 weeks	Pentavalent , OPV	RV(1,2,3) , PCV(1,2) , f IPV
9 months	Measles 1 /MR-1 , Vit A	PCV_B , JE_1
16-24 months	MR- II , DPT_B , OPV	JE_2
5-6 years	DPT_B	
10-16 years		Td

- BCG : Bacillus Calmette Guerin
- OPV : Oral polio Vaccine
- HepB : Hepatitis B vaccine
- Pentavalent vaccines : DPT (Diphtheria , Pertussis , Tetanus) + DPV
- MR : measles , Rubella vaccine
- RV : Rota virus vaccine
- PCV : Pneumococcal conjugative Vaccine at 6th , 14th week
- fIPV : Fractional Injectable polio Vaccine at 6th , 14th week
- JE : Japanese Encephalitis vaccine given only in Endemic districts
- DPT_B : DPT booster dose
- PCV_B : Pneumococcal conjugate vaccine booster dose

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Live Vaccines 00:13:38

(i) Live Vaccines : BCG
: OPV
: Rotavirus Vaccine
: measles
: MR

(ii) Age limit

till 1 day	1 year	5 years	7 years	15 years
Hep B '0'	BCG Pentavalent RV, IPV, PCV	DPV measles, MR vitamin A	DPT booster	JE

Individual Vaccines 00:17:15

(i) BCG Vaccine

- Given at : Birth
- Live vaccine
- Dose : 0.1 ml, intradermally, in left upper arm
- Prevention against : Complicated TB, Bladder Cancer, Leprosy
- India : 0.05 ml is given at birth.
- Dilution : Normal saline or the diluent
- Brown coloured vial
- Powdered form.

(ii) Hepatitis B Vaccine :

- Zero dose : within 24 hrs
- Age limit : within 1 year of age under NIS
- A formalin inactivated sub unit vaccine
- Dosage :
  - Adult : Zero, 1 month, 6 month, given I.M
  - Child : 6, 10, 14 weeks, 0.5 ml I.M anterolateral aspect of thigh
- Adult :
  Hepatitis B vaccine + Anti HB_s Ig (enhances the effect of post exposure prophylaxis)

(iii) measles vaccine / MR vaccine

- Dose : 0.5 ml s/c in right upper arm (insertion of triceps)
- Brown vial with powdered formulation
- Diluent : Distilled water
- Adverse effect : fever with rash
  : rare :- SSPE (Subacute sclerosing pan Encephalitis)

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(iv) Pentavalent vaccine

- DPT, Hepatitis B and H influenza B vaccine
- Dose : 0.5 ml IM in left anterolateral aspect of thigh
- Formula : white amorphous liquid
- Adverse effects : (i) Pertussis component : Neurological deficits
  - ∴ Contraindicated in Immunodeficient, neurological disease
  - DTaP : diphtheria, tetanus, acellular pertussis is given in contraindicated individuals.
  (ii) Diphtheria component : Uncontrollable cry (m.c side effect)

(v) Rotavirus Vaccine

- Rotateq, Rotarix, Rotavac
- Route of administration : Oral, 5 drops, at 6, 10, 14 weeks.
- Age limit : till 1 year of age
- Adverse effects : Intussusception

(vi) Bivalent Oral Polio Vaccine (b OPV)

- National switch day – 25th April 2016
- India switched from trivalent OPV → bivalent OPV (P_1, P_3) since then.
- Formula : Pink liquid
- Route of administration : Oral
- Age limit : can be given till 5 years of age in an unimmunized.

(vii) Pneumococcal vaccine (PCV)

a) PCV (pneumococcal conjugate vaccine) for children

- PCV_{10}, PCV_{13} strain – 0.5 ml, IM in anterolateral thigh
- India : PCV_{13} – primary dose at 6 and 14 weeks
  – booster dose at 9 months of age

b) PPV (Pneumococcal polysaccharide vaccine)

- PPV_{23} strains.
- Should not be given for age < 2 years
- Indications : Splenectomy
  : Immunodeficiency
  : Chronic Kidney disease
  : Long term steroids
  : Organ transplant recipient
  : Hemolytic Anaemia

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(viii) Japanese Encephalitis Vaccine (JE Vaccine)

a) Live Vaccine

- India : SA – 14-14-2 strain is used
- Diluent : Phosphate buffer
- Dose : 2 doses (9 months, 16-24 weeks), 0.5 ml s/c in left upper arm under NIS
- Age limit : < 15 yrs (in an unimmunized child). 2 doses can be given with 3 months gap between the two doses

b) Killed Vaccine

- Nakayama strain and Beijing strain

ix) Fractional injectable polio vaccine (fIPV)

- IPV : Killed vaccine, salk strain
- WHO : Dose – 0.5 ml IM in Anterolateral aspect of right at 6, 10, 14 weeks
- India : f IPV – 0.1 ml intradermal in right upper arm at 6, 14 weeks

Unimmunized Child

00:38:02

- A child who is not immunized since birth guidelines :

(i) All due vaccines (7 vaccine preventable diseases) should be given in the same session

(ii) The vaccines due for that specific age should be preferred first

- Example : (a) A 3 yrs old child, not immunized since birth
  Vaccines administered : OPV, DPT, measles, Vitamin A
  Live vaccine are given preferably with a gap of 4 weeks each
  (b) A child < 1yr, not immunized since birth
  Vaccine administered : BCG, measles, OPV, PV, Vit A, JE in endemic district

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STRAINS AND OTHER APPROVED VACCINES

Universal Immunization programme includes 7 vaccine preventable disease (VPDs):

Diphtheria, Pertusis, Tetanus, Poliomyelitis, measles, Hepatitis B, Tuberculosis

Strains of vaccines 00:01:04

- BCG – Danish 1331
- measles – Edmonston Zagreb
- Mumps – Jeryl Lynn
- Rubella – RA 27/3
- Polio – Sabin – bOPV (P_1, P_3)
  Salk – fIPV

Other approved vaccines 00:02:25

1. Yellow fever vaccine.
- Strain: 17 – D strain
- Dose: 0.5ml (subcutaneous or IM)
- Efficacy: starts 7 – 10 days after vaccination
  Validity: lifetime
- Given to all individuals travelling to yellow-fever endemic areas
- Given to children aged > 9 months.
- Age < 6 month: vaccine is contra – indicated.
- Age between 6 – 9 months: vaccine used cautiously.
  (only during epidemic or inevitable travel to yellow fever endemic areas)

Meningococcal vaccine:
- Quadrivalent vaccine.
- Strains used: A, C, W 135, Y serotypes.
- Maximum chance of hypersensitivity reactions
  – usually mild (local erythema)

Rabies vaccine:
- Tissue cell culture vaccines not used because it causes neurological effects
- Human diploid cell culture vaccine is used.

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- For patients on malaria treatment or Proguanil therapy, intramuscular injections to be given instead of intradermal injections

Cholera vaccine

- 3 types :

1) Dukoral : contains subunit B, requires gastric buffer (bicarbonate buffer)

2) Shanchlo : no subunit
better vaccine
gastric buffer not required

3) Euvichol

- Administered to travellers only

Dengue vaccine

- Called Dengvaxia .
- Given for individuals of age between 9 yrs - 45 yrs .
- Strain : CYD -TDV - Tetravalent vaccine .
- To be given at 0, 6, 12 months (3 doses) .
- WHO / FDA approved vaccine .

Malaria vaccine :

- Circumsporozoite protein (CSP) vaccine used
  RTS , S / AS01 Vaccine .
  R : Rapid repeat region of CSP .
  T : T-cell epitope of CSP .
  S : Hepatitis - B surface antigen .
  AS01 : Adjuvant (boosts immune response to vaccine) .
- Im injection, 2 doses, 1 month apart .
- Lyophilized vaccine, diluent to be used .
- Reconstituted vaccine to be used within 6 hours .

Vaccine for leprosy :

- Strain used : mycobacterion indicus pranii (MIP)
  - Also known as Mw vaccine

Vaccine for AIDS

- Multiple trials are being conducted
  1. r AAV : recombinant adeno associated virus vaccine
  2. Ankara
  3. AIDS VAX

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Typhoid vaccine

- Oral typhi 21 a :
  - To be used in individuals aged > 5 years
  - Live vaccine

- ViPolysaccharide :
  - Used in age > 2 years
  - Given to all adults and immunocompromised individuals .

Guidelines / Targets 00:14:00

- Global Vaccine Action Plan (2011 - 2020)
  - 100% immunization coverage .
  - > 2/3rd reduction in under-5 mortality .
  - Poliomyelitis eradication .
  - Neonatal tetanus, Measles, Rubella - to be eliminated in atleast 2 WHO regions .

- Mission Indradhanush (MI)
  - To achieve 100 % immunization coverage .
  - In 2016 - 17, Intensified Mission Indradhanush (IMI) was launched

  - Under intensification :
    - No new vaccines added .
    - To cover slums, brick Klin workers, urban slums, nomads, tribal areas .
    - Aggressive approach to be followed in low-performing districts
    - New mobile app launched, now merged with Kilkari (mobile app to monitor growth and development of a child)

Fully immunized child :
Child who has taken all due vaccines till 1 year

Completely immunized child
All due vaccines are completed in a child till 23 month age (< 2 years)

Immunisation status in special situations 00:19:49

1 . Immunizatioin in a disaster :
m . C .disease after a disaster → Acute gastroenteritis → Can lead to malnutrition → Vit. A deficiency → can Cause measles .

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∴ - measles vaccine maybe used after a disaster.
- Cholera vaccine is not used

2. Diarrhea:
- bOPV is usually given orally and can be eliminated fast during Diarrhea.
- During diarrhea, bOPV is given as uncounted dose.
- After 4 weeks, does is repeated.

3. Immunization in HIV:
- All vaccines are given to HIV positive children
- In HIV positive children who are symptomatic or CD4 < 15% → Live Vaccines are contra-indicated.

4. Immunisation in Rubella outbreak:
Vaccination strategy

1st priority: Women in reproductive age (WRA)
[Non - pregnant female] [15 - 20 years to 39 years]

2nd priority: All children aged 1 year to 14 years

3rd priority: infants < 1 year

5. measles Rubella (m R) campaign:
- 1 dose MR vaccine to all children aged between 9 months to < 15 years.
- Given irrespective of prior immunization or disease status.
- This dose of vaccine is considered as added /extra dose.
- National immunizatioin schedule to be continued irrespective of added extra dose, with a minimum gap of 4 weeks.

* MR surveillance : done for all age groups
* AFP Surveillance : done in children < 15 years of age.

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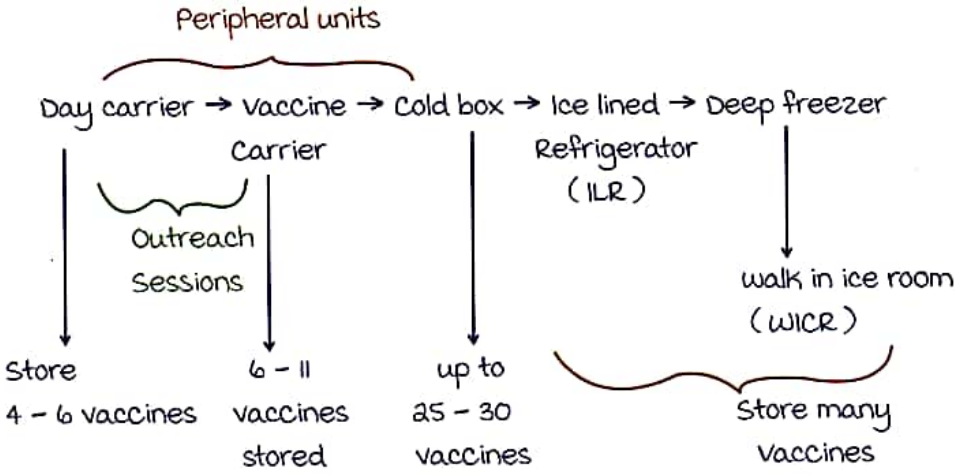
COLD CHAIN & AEFI

Cold chain

00:00:09

System to maintain the temperature of vaccines from the manufacturing point to the end point.

Equipments :



- ILR : Available at a PHC / CHC, urban health centres
- Deep freezer : available at district hospital / district units
- WICR : Regional level storage

Temperature requirement :

For outreach session : 2 – 8°c

Storage : – 20 to – 40°c

- At the PHC / CHC level → ILR / deep freezer : store vaccine for upto 1 month
- At the district level → WICR : store vaccine upto 3 months will serve 4 – 5 districts
- Ice packs → prepared in deep freezer / WICR
- ILR can function for 6 – 8 hours without electricity

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Leave Feedback

- The temperature of ILR, Deep freezer are measured twice a day and recorded using Dial thermometer

Thermosensitivity of vaccines 00:06:53

In a refrigerator:

Freezer → Ice packs are kept, No vaccines
Top shelf → polio, vaccine measles vaccine, BCG, Je vaccine
Lower shelf → DTP, T_a, DTap, TT, Hep B vaccine
(Away from freezer)
Middle shelf → All other vaccines
Door of the refrigerator → Diluents & water bottles
↓
Replaced 3 monthly

Vaccines kept in the ILR:

Lower zone (coolest): polio vaccine, measles, BCG, JE vaccine
Upper zone (less cold): DTP pentavalent vaccine, DTap, Hep B vaccine
Middle zone: All other vaccines

Vaccines

Heat sensitive	Cold – freeze sensitive
BCG: heat stable, light sensitive	DPT
OPV: heat sensitive	Td, TT
measles: heat sensitive + light sensitive	Hep B vaccine
↓	↓
• Opv > measles > BCG > Varicella (Raw vaccine)	Hep B vaccine > DPT
• Reconstituted vaccine: r BCG > OPV > r measles > BCG > JE	Td > TT

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Vaccine vial monitor (VVM) 00:15:32

Indicator : paratoluene sulfonate (PTS)

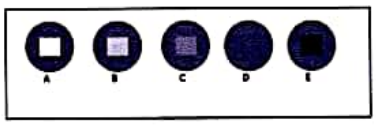
↓

Indicates the heat lability of the vaccine

The colour in the square box = Colour outside the square box

↓

Vaccine is discarded



Open vial policy 00:17:50

- Initiated in 2015
- Any vaccine which is opened , Should be used

With in 28 days . (OPV , PPT , TT , IPV , HepB , Pentavalent vaccine)

- Not applicable to : measles vaccine (with in 4 hours)
  Rotavirus Vaccine$_a$ (4 - 6 hours)
  JE Vaccine (2 hours)
  BC4 Vaccine (4 hours)

  } To be used in the same day of opening

↓

Because after reconstitution

↓

Risk of staphylococcal infection ⊕

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Shake test

00:21:10

DPT → Freeze sensitive vaccine

↓

When DPT vaccine becomes frozen
The diluent ($Al(OH)_3$)

↓

Produce precipitates

↓

NON POTENT VACCINE
(Hence discarded)

Shake test : to identify non potent vaccine
→ Seen in DPT vaccine
Test vaccine

↓

Shaken

↓

Compared to control (vaccine frozen for 10 hours at -10°C)

- White amorphous → ↓ USE (Rate of precipitation is very slow / No precipitation)
- Clear liquid with Precipitates → ↓ DISCARD

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AEFI

00:29:05

- Adverse Effects following Immunization
- Classified into 5 categories

1. Product related :
   Inherent to the vaccine
   eg : Neurological defect with Pertussis vaccine

2. Quality related :
   - Quality defect in the vaccine
   - due to manufacturing defect / defective management of quality check

3. Immunization error :
   - Also known as programmatic error
   - Preventable causes of AEFI
     ↓
     Inadequate cold chain
     Non sterile techniques
     Faculty administration
   - most lethal errors .

4. Anxiety related :
   - Not related to vaccine
   - In children : cyanosis, unstoppable cry, flushes

5. Coincidental error :
   - Any other reason apart from product, quality and Immunization error .

Adverse effect of various vaccines

00:33:23

1. BCG :
   Suppuarative lymphadenitis
   BCG induced infection
   Fever, pain, scar
   } rare ⇒ 2 - 6 months after Vaccination

2. OPV :
   Vaccine associated paralytic poliomyelitis (VAPP)
   - Occurs within 4 - 36 days .
   - Happen within 2 - 4 per 10 lakh population
3. Hepatitis B Vaccine : Anaphylaxis

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4. Pertussis vaccine
(Whole cell pertussis vaccine / DPT / Pentavalent)

m/c
- Persistant cry (> 3 - 4 hours) → happiness within 24 hours
- Hypotonia
- Encephalopathy

} 0 to 2 or 3 days

5. Tetanus toxoid:
Brachial neuritis (occur in 2 - 28 days)
Anaphylaxis (1 - 4 cases / 10 lakh)

6. Measles vaccine → m/c adverse effect: measles like illness.
Febrile seizures (6 - 12 days)
Thrombocytopenia (within 1 month)
Sub acute sclerosing pan encephalitis (SSPE): rarest

7. Rotavirus: ↳ 6 - 12 Days
Intussusesception (occurs within 3 - 13 days)

It is recommended to observe patients receiving vaccine for 15 to 30 minutes.

Maximum chance of any reaction:
Meningococcal vaccine
Hepatitis A vaccine
DPT vaccine
Measles vaccine.

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PREVENTIVE GERIATRICS

- Geriatrics – Old age

Problems of old age 00:01:03

m C morbidity	Others	Psychological
- Cataract, Glaucoma	- Cardiovascular disorders	- Mental changes
- Neural Deafness (40-50dB)	- BPH	- Sexual changes
- Failure of special senses	- Detrusor Instability	- Emotional changes
- Locomotary Disability	- Cancer	
- Emphysema	- Accidents / Falls	

- m/C organ dysfunction: Cardiovascular Disorders (including HTN & DM)

- 1999 – National Policy For Older Persons (NPOP)

  * To open – Old Age homes
    - Day care centres
    - Vocational Courses to learn new skills
    - Rehabilitation centres – physiotherapy

  * Vayoshri Yojana – ↑ Old age homes under public-private partnership

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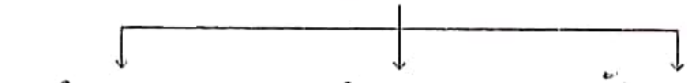
Leave Feedbac

Strategies of NPOP

00:06:56



1° Prevention	2° Prevention	3° Prevention
- ↑ in diet - ↑ in exercise - ↑ in weight - Stop smoking / drinking - Promote socialization	- Early diagnosis § Prompt treatment	- Rehabilitation of older people - Using social organization or NGO. [Eg Help Age INDIA, Rotary International]

- Weight reduction is the most important factor for changing the quality of life

Scanned with CamScanner

NUTRITION - CONCEPT & MACRONUTRIENTS

Proximate principles 00:00:35

- Energy providing food products
  - Carbohydrates → 4 KCal / g
  - Proteins → 4 KCal / g
  - Fat → 9 KCal / g

1 Kcal = 4 . 184 KJ
1 KJ = 0 . 239 Kcal

Fibre ⇒ 2 Kcal / gm
Alcohol ⇒ 7 Kcal / gm

Reference male & female 00:03:11

	Reference male	Reference female
• Age	18 - 29 yrs	18 - 29 yrs
• Weight	60 Kg	55 Kg
• BMI	20 . 3 Kg/m^2	21 . 2 Kg/m^2
• Height	1 . 73 meters	1 . 61 meters

And work for 8 hrs, sleep → 8 hrs, light activity → 4 - 6 hrs
Active recreation → 2 hrs .

Dietary goals 00:04:47

Carbohydrates → 50 - 70 %
Proteins → 10 - 15 %
Fat → 10 - 30% ~ 20 %

Fibre : 40 gm / 2000 cal .

Prudent diet, balanced diet, staple diet 00:05:47

Balanced diet :
All the nutrients are in sufficient, so as to prevent any nutritional excess / deficiency

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Prudent diet :

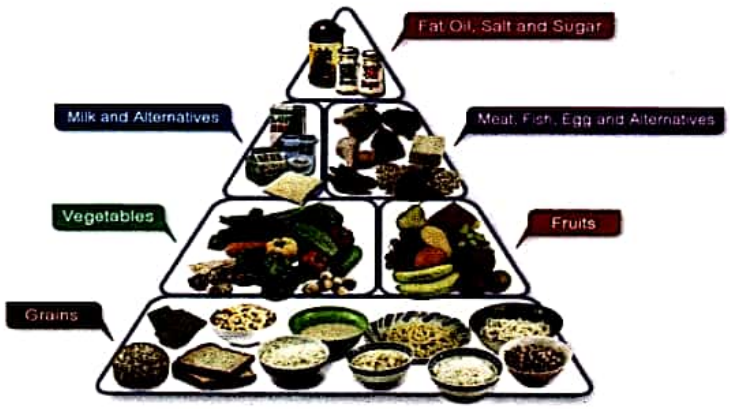
It is a temporary diet which adheres to a particular diet goal (according to physiological demands)

eg : Renal diet, Diabetic diet
Ketodiet : high fat diet
Paleo diet : raw vegetables / fruits
Atkin diet : high fat, high protein (low carbohydrate) diet
↳ Side effects : metabolic disturbances, cardiovascular abnormalities

Staple diet :

The diet that is consumed by majority of population & is locally available & culturally accepted.

Food pyramid



Food adulteration, additive, fortification & enrichment

00:10:34

Food adulteration :

Any substance which when added to the food product decreases its nutritive value & is harmful to human body

eg : Argemone mexicana → mustard oil
Brick powder → chilli powder
Soil / sand / other chemicals → turmeric powder

Food additive :

Any substance which is added to food product that does not alter the nutritive value but increases the shelf life or increases consumability

eg : artificial flavours / preservatives in food products.

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Food fortification :

Any substance which is added to the food product inorder to increase its nutritive value .

The substance added may not be initially present in the food product

eg : addition of iodine to salt, vitamins to oil .

Food enrichment :

Any substance which is added to the food product inorder to increase its nutritive value

The substance added : present in lower quantities initially in the food product .

eg : iron in cereals, biscuits

iron and minerals in baby foods

Recommended dietary allowance (RDA) 00:15:54

	Male	Female	Infants	Children	Adolescent
Sedentary	2320	1900	500-670	1000-1700	2200 – 2450
Moderate	2730	2230			
Heavy	3490	2850			
Kcal/kg/day	40-60	35-55	80-90	70-80	50-70

Proteins 00:18:36

Function : maintains body structure,
required for the synthesis of DNA, RNA, Genomic material, histone, hemoglobin, transport protein, membrane protein .

RDA : adults → 1 g/kg/d
infants → 1 . 16 – 1.7 g/kg/d

Pregnancy → + 23 g/d
Lactation (0-6 mon) ⇒ + 19 g/d
(0-12 mon) ⇒ 11 – 13 g/d

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Protein quality indicators

00:21:08

1. Amino acid score (AAS):

$$= \frac{\text{Amount of amino acids in the food product}}{\text{Amount of same amino acids in the reference protein (egg protein)}}$$

2. Net protein utilisation (NPU):

⇒ Composite indicator

⇒ NPU = Digestibility coefficient × Biological value

↓ ↓

$$\frac{\text{Amount of protein absorbed}}{\text{Amount of protein digested}} \quad \frac{\text{Amount of protein retained}}{\text{Amount of protein absorbed}}$$

$$\Rightarrow \text{NPU} = \frac{\text{Amount of } N_a \text{ retained for body structure}}{\text{Total protein ingested}} \times 100$$

3. PDCAAS (Protein digestibility coefficient corrected aminoacid score)
Aminoacid score adjusted with digestibility coefficient.

4. DIAAS (Digestible indispensable aminoacid score)
- Best indicator

DIAAS >> PDCAAS >> NPU >> AAS

5. Protein energy ratio

$$\frac{\text{Amount of energy from protein in food product}}{\text{Total energy from diet}} \times 100$$

Fish ~ 80 % Milk ~ 60 – 70 %

6. Protein efficiency ratio:
Amount of weight gain per gram of protein consumed.

Limiting aminoacids

00:35:05

Aminoacids that are deficient in certain food products

- Cereals → Lysine + Threonine

⇓

most common

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- Pulses → Cysteine + methionine
- Maize → Lysine + Tryptophan

↓

Precursor of niacin

60 mg Tryptophan → 1 mg Niacin.

Deficiency of Tryptophan → Deficiency of Niacin

↓

Pellagra

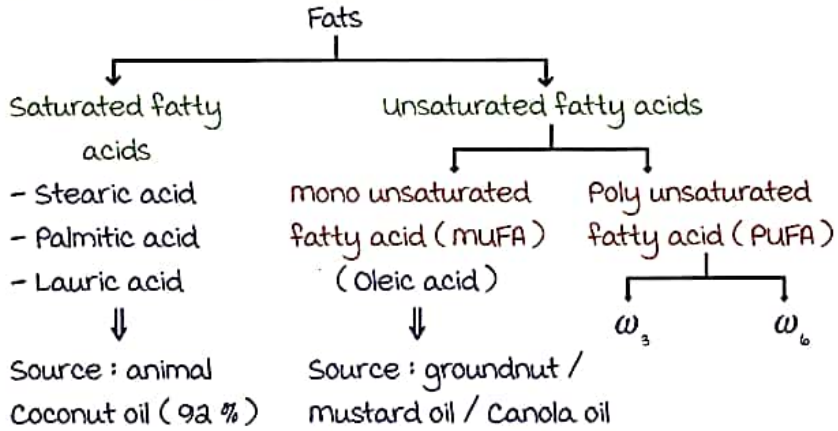
Maize contains ↑ Leucine → potent inhibitor of conversion of Tryptophan → Niacin.

Fats

00:37:55

Function : - thermal stability of the body
- Insulator
- neurological system → major component of myelin
- healthy skin

RDA : 20 % of total diet



	ω_3	ω_6
• Names :	∝ - Linolenic acid	Linoleic acid
• Source :	Flax seed	Safflower
• Long chain derivatives :	Eicosapentanoic acid	Arachidonic acid
• Source of Long chain derivatives :	Fish, Corn	milk, egg, soya

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Leave Feedbac

RDA of fat (20 %)

- saturated fatty acid (< 10 %)
- Unsaturated fatty acid (90 %)
  - MUFA (1/3)
  - PUFA (2/3)
    - ω_3 (50 %) ⇓ 1/3
    - ω_6 (50 %) ⇓ 1/3

MUFA : ω_3 : ω_6 ⇒ 1 : 1 : 1

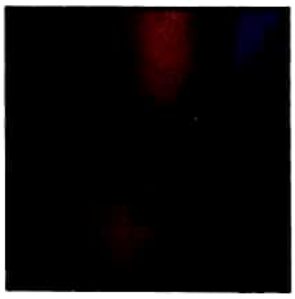
Partially hydrogenated vegetable oils 00:49:12

→ Vanaspati ghee / dalda ghee
Vegetable oil

→ Partial hydrogenation ⇒ ↑ solidification of fat
⇓
better storage & transport

→ Food fortification
- Vit A ⇒ 2500 IU / 100 ml of oil
- Vit D ⇒ 175 IU / 100 ml of oil

Phrynoderma
- Toad like skin
- Deficiency of essential fatty acid
- Treatment : fatty acid emulsificants



Glycemic index 00:52:09

- Rate of increase in blood sugar levels

High	Moderate	Low
(Artificial products) white bread white rice	Brown rice Dairy products	(Natural food) vegetables, fruits, whole grains, oats, quinna, lentils, cereals

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- Cereal with highest glycemic index : corn
- High glycemic index : cornflakes
- Fruits : moderate / low glycemic index
  - Melon, grapes → high glycemic index
  - Guava, berries, Indian jujube → low glycemic index
- Highest fat among fruits : Avocado
- Low glycemic index : dates, acaiberry

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NUTRITION - MICRONUTRIENTS

Hidden hunger 00:00:27

It means micronutrient deficiency
mc micronutrient deficiency in the world – Iron deficiency
mc Vitamin deficiency is Vit. A deficiency

Retinoic Acid (Vitamin . A) 00:01:29

Vit.A – Active Component is Retinol
1 Retinol Equivalent = 3.33 IU of Vit. A
1 IU Retinol = 8 times for β carotine

Recommended Dietary Allowance (RDA) :
Vit . A in , children = 400 IU ⟶ 3200 U
(for β carotene → x 8)
Adults = 600 IU ⟶ 4800 U
Pregnancy = 800 IU ⟶ 6400 U
Lactating = 950 IU ⟶ ~ 7200 U
females

Functions :
- Vision (adaptive vision) – Present in rods & cones .

Source :
- Richest – Halibut fish
- Other – Cod fish
- Vegetables – Palm oil , Orange coloured fruits / vegetables , carrots

Deficiency : Xerophthalmia
In Xerophthalmia , the stages are as follows
XN → Night blindness (first thing to develop in vit. A deficiency)
↓
X Ia → Conjuctival Xerosis
↓
X Ib → Bitot spots
↓
X II → Corneal xerosis
↓
X IIIa → Corneal ulcer ⟶ Keratomalacia / Corneal scar
↑
X IIIb

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- Non specific features of Xerophthalmia ;
  - X_N → Night blindness
  - X_F → Fundal changes
  - X_S → Corneal scarring
- Specific changes → XIa , XIb , X II , X IIIa , XIIIb .
- First Clinical sign in Xeropthalmia – Conjunctival Xerosis
- Most important epidemiological marker – Bitot spots
- marker for permanent / irreversible eye damage – after XII (ie : XIII_A , XIII_B)

Xerophthalmia : is classified into 3 parts by WHO ,
- Stage I(A , B) , II are reversible changes.
- Stage III(A , B) are irreversible changes .

Targets to National programmes for Indicators :
- Bitot spots – < 0.5 % in school going children
- Night blindness – < 1 % in school going children .
- Corneal ulcer – < 0 . 01 %

National vit . A Prophylaxis programme :
- vit . A given to all children under age of 5
- Children of 6 months to 9 months = 1 lac IU (vit . A Oral solution)
- Child of 1 year till 5 years of age = 2 lac IU every 6 months
  " 1 lac IU ≃ 1 ml "
- Spoon given for the administration of vit. A under this programme → inner marking = 1 ml, outer marking = 2 ml.

Thiamine

00:11:41

- It is vit B_1.
- RDA – 1. 1 – 1.7 mg / dl (~ 0.5 – 0.6 mg / 1000 Kcal)
- No exogenous requirement
- Function → metabolism of carbohydrates
- Sources – Cereals , pulses , nuts (ground nuts) , sesame seeds , milk
- Deficiency – Beri Beri , Wernicke's encephalopathy

Beri Beri :
Are of 2 types ; a) Dry Beri Beri – Peripheral Neuritis .
b) Wet Beri Beri – Cardiac involvement .
- Infantile Beri Beri → in child < 1 yr age , peak is at 2 – 4 months of age . This is due to vit . B , deficiency in mother .
- Washing & then cooking rice causes loss of vit . B_1 as Aleurone layer is the outermost layer in rice which is rich in vit B_1 .

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- Dehusking, Milling & polishing also causes the loss of Aleurone
- Loss of Aleurone prevented by Parboiling.
  i.e. - Preserves vit B_1

Wernicke's Encephalopathy:
- Seen in alcoholic patients.
- Causes - Ophthalmoplegia, polyneuritis, Mental disturbance, memory loss, Ataxia.

Riboflavin 00:19:17

- It is vit B_2
- RDA - 1.1 - 1.2 mg / d (~ 0.6 - 0.7 mg / 1000 Kcal)
- Functions - Cellular Oxidation
  Maintains integrity of cell membrane
  Antioxidant
- Source - • Predominantly - liver, Kidney of animals
  • High in - Milk, eggs, green leafy vegetables.
- Deficiency - Ariboflavinosis, Angular Stomatitis

Niacin 00:21:31

- It is vit B_3
- RDA - 6 mg / 1000 Kcal
- Function - metabolism of carbohydrate & protein
- Source - Good - liver, meat, poultry
  Poor - milk
- Deficiency -Pellagra

"Niacin deficiency is known as disease of poverty".

Pantothenic acid 00:22:52

- It is vit B_5
- Function - Adreno - cortical functions
  Synthesis of steroids
- Deficiency - Burning foot Syndrome

Pyridoxine 00:23:30

- It is vit B_6
- Required for patients on Isoniazid treatment, given at > 10 mg / day
- RDA - 2mg / day
- Function - increase Neural Conduction
- Source - meat, poultry, fish, milk.
- Deficiency - Peripheral neuropathy.

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Leave Feedback

Folate

00:24:39

- It is vit B_9
- RDA → 200 – 300 mcg / day = Adults
  80 – 120 mcg / day = Children
  500 mcg / day = Pregnancy
  300 – 400 mcg / day = Lactating female
- Function – Synthesis of Bone marrow, nucleic acid
- Source – Green leafy vegetables, milk, meat & dairy products
- Deficiency – Megaloblastic Anaemia, Glossitis, Cheilosis
- Folic Acid – is easily destroyed by heat ;
  ∴ Repeated heating / boiling will ↓ Folic acid levels in milk.
- Giving Folic Acid Antagonists during pregnancy may lead to abortion.
  Folic Acid Antagonists – Pyrimethamine, Cotrimoxazole, Alcohol.

Cyanocobalamin

00:28:06

- It is vit B_{12}
- It is a organometallic compound with Cobalt atom
- RDA – Adult → 1– 3 mcg / day
  Pregnancy → 1.2 – 3.2 mcg / day
  Lactation → 1.5 – 3.5 mcg / day
  Infants → 0.3 – 0.5 mcg
- Functions – folic acid synthesis
  – myelination
- Source – liver, kidney, meat, poultry, Egg, milk
- Deficiency – Pernicious Anaemia

Ascorbic Acid

00:30:37

- It is Vit c
- RDA – 40 mcg / day
- Function – Collagen formation
  – Iron absorption
  – Antioxidant
- Source – Fruits (Citrus), Green leafy vegetables, Chillies, Sprouts (germinated foods)
- Deficiency – Scurvy
- Man, monkey, Guinea Pig are ones that require vit. C among all animals.

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1 - 25 Dihydroxy cholecalciferol 00:32:18

- It is vit D. (Known as Kidney Hormone)
- Vit D_a - Plant origin
- Vit D_3 - Animal origin
- RDA - 1-2 Yr → 400 IU / day (10 mcg)
  Adults - Indians ~ 60 - 80 % of population is vit. D deficient
- Source - Halibut fish, Cod fish - Rich source
  Other - fishes, eggs, Butter, Human milk
- Deficiency - Osteomalacia / Rickets.

Tocopherol 00:34:56

- It is vit E
- RDA - 0.8 mg / gm of essential fatty acid ingestion.
- Function - Fat metabolism
- Source - Oils, Cotton seeds, Sunflower, butter, milk (low source)

Phylloquinone / Menadione 00:35:52

- It is Vit K
- RDA - 0.03 mg / Kg
- for normal adults - Supplementation not required
- Function - Coagulation of blood
- Source - Fresh green vegetables & fruits.
- Deficiency - Coagulopathy,
  Hemorrhagic disease of New born (HDN)
- Due to minimal Prothrombin & low gut flora
  ↳ New borns are in risk for Vit K deficiency or HDN

∴ IM injection of 0.5 mg of vit K given as prophylaxis of HDN.

Minerals 00:37:53

Calcium:

- Function: Bone function, Coagulation, Muscle contraction
- Source: Milk, egg, fish → Non - veg sources.
  green leafy vegetables, cereals, Ragi → veg - sources.
  Ragi - Richest source of calcium.

Calcium absorption:

- ↑ in presence of vit. D
- ↓ in presence of phytates, oxalates, fatty acids
- Bioavailability of Consumed Calcium → 20 - 30 %
- RDA - 600 mg / day

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Phosphorus :

- Is linked to Ca^{2+} requirements
- Adults → 1 : 1 = P : Ca^{2+}
- In children (< 3 yr) => 1 : 1.5 = P : Ca^{2+}
- Function – Bone & mineral metabolism

Sodium :

- Constitutes 100 gm of total body weight
- Salt intake → < 5 gm / day

Potassium :

- Constitutes 250 gm of body weight
- RDA = Na^{+} : K^{+} = 1 : 1

Magnesium :

- Constitutes 25 gm of body weight
- required for bone Ca^{2+} & K^{+} metabolism
- Deficiency seen in : Renal / liver disease ,Chronic Alcoholism , Toxemia in Pregnancy .
- Deficiency – Tetany , Hyper /Hypo Reflexia

Iron

00:43:28

- Constitutes 3–4 gm of body weight
- 1 Hb = 3.34 mg Iron

RDA : 17 (male) –21 (female) mg / day

Pregnancy – 35 mg / day
Adolescent – 28–32 mg / day

Function – Hb synthesis , metabolism , Catecholamines synthesis

Deficiency – Anaemia , if Hb level is

< 11	< 12	< 13
↓	↓	↓
In pregnancy	♀	♂

Sources of Iron –

- Heme sources → Animal source : meat , poultry
- Non heme sources → Breast milk ,
  Bioavailability – upto 75 % in breast milk .
  Tofu , Soya , Sea weed ,
  green leafy vegetables , Bengal gram

Absorption : 1st part of duodenum

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Absorptive determinants :

- Absorption promoters → Vit . C
- Absorption Inhibitors → Phytates , Tannins , Fiber , Oxalates , Phosphates , Calcium .

Evaluation of Iron :

- Hb :- Insensitive method to access community for Iron defficiency
  - MC used to access Anemia in community .
- Serum Iron : Normal = 0.8 – 1.8 mg / dl.
  - < 0.5 = Iron deficiency
- Serum Ferritin : < 10 mcg / L = Iron deficiency
  - Most sensitive method for Iron deficiency in low anemia prevalence area .
  - Indicates the Iron stores .
- Serum transferrin status –
  - It is a Chemical Indicator .
  - If Transferrin saturation , < 16 % = Iron deficiency
    > 50 % = Iron over load

Iodine

00:55:00

RDA – Adult = ~ 160 mcg / day
Pregnancy = ~ 250 mcg / day
lactation = ~ 290 mcg / day

Function : Thyroid hormone Synthesis

Source : Sea = sea weed (Japanese) ⟶ Richest source .
Octopus , other sea food
Soil = Potato (rich source) , onion , other roots .

Goitrogens : food that inhibit Iodine uptake
eg : Brassica group of vegetables – Cabbage , Cauliflower , Turnip , Broccoli .

Assessment of Iodine status in Community :

- Prevelance of Goiter in area
- Urinary iodine excretion → most sensitive Indicators , It is epidemiological indicator .
- Cretenism rates .

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Fluorine , Zinc , Copper 00:58:27

Fluorine :

- Function - Mineral metabolism of body
- Source - water → 0.5 - 0.8 mg / L (or) 1 ppm
- Deficiency - Dental caries
- Excess - Fluorosis

Defluorination of water = Nalgonda Technique

Zinc :

RDA - 10 - 12 mg / day - Adults
5 - 6 mg - children

- Recommended level of zinc in body 90 - 100 mcg / 100 ml of blood
- Function : Antioxidant , Co- factor in ezyme , Insulin secretion , Immunomodulator .

Copper :

- Normal level of Copper - 100 - 150 mg
- RDA - 1.8 - 2 mg / day
- Low copper levels in - Wilson ' s , Nephrosis , Protein energy malnutrition (PEM)
- ↑ Copper levels in - Infection , MI , Hyper Thyroid state
- Mc manifestation of copper disturbance - Neutropenia
  Associated with copper deficiency ↵

Other metals :

- Chromium : Insulin function , Carbohydrate metabolism
- Selenium : PEM , Cardiac health , Immunity .
- Molybdenum : - Bone deformity , Mineral metabolism
  - Risk factor for : Carcinoma stomach / oral cavity / Esophageal

Antioxidant 01:04:37

- Vit - B2 , C , E , β Carotene
- Enzymes - Super oxide dismutase , Catalase
- Others - Flavonoids , Selenium , Zinc , Copper

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Tongue Color	Cause
• Magenta / Red	B_a } deficiency
• Beefy / dark red	B_{1a} } deficiency
• Raspberry / strawberry	Scarlet fever

Sources :

	Richest sources
• Vit B_a	Liver
• Vit B_1	Covering of cereals
• Vit C	Amla (Indian gooseberry)
• Vit D	Cod fish / halibut fish
• Vit A	Halibut fish (Richest)
	↳ palm oil
	Carotene → Mango > Papaya
• Activated vit . c	Sprouts , germinated food .
Amylase rich	
• Iron	Jaggery
• Iodine	Japanese sea weed
• Calcium	Custard apple
• Calcium + Iron	Almond , Resin , Dates
• Roughage	Cellulose component
	(↑ bowel movements)

Hyderabad mix :

- Good source of energy + fat + minerals
- Composition : Groundnut + Jaggery + Bengal gram .

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NUTRITION-FOOD PRODUCTS, ADULTERANTS AND STANDARDS

Cereals

- Grains –350 Kcal/100gm
  – 6–9% of proteins
- Maize has → High Leucine and fat
- Jowar has → High carbohydrate
- Bajra has → High protein and fat, maximum amount of iron
- Ragi has → Maximum amount of calcium and low fat
- Rice → Staple food in India
  → Slightly high lysine
  → Low in vitamin A, C, D, iron and calcium
  → Parboiling: • To retain vitamin B_1 present in outer covering of rice
  • Hot soaking process

↓

Soak the rice in 60–70°C

↓

3–4 hours (stay)

↓

Drain the water and steam for 5–10min

↓

Dry

↓

Store

Egg

00:04:00

- Oval in shape (Rule of 6)
- 60 gm
- 6 gm of protein
- 240 mg cholesterol
- 30 mg calcium
- 1.8 mg iron

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Leave Feedback

- Weight distribution: Egg yolk , Egg shell, Egg white

30% of wt	10–12% of wt	58–60% of wt

Salient features of egg:

- Maximum NPU (Net Protein Utilisation) – 9%
- Richest source of cholesterol
- Rich in DHA (Decosahexaenoic Acid)
- Avidin (destroyed by heat) → Causes Biotin deficiency in raw egg consumers

Freshness of egg:

- Fresh egg – Sinks in water
- Rotten egg – Floats in water

Fish

00:08:14

- Rich in protein
- Maximum protein energy ratio (low carbohydrate)
- Good source of vitamin A and D, calcium and phosphorus
- Rich in iodine (deep sea fishes)

Freshness of fish

Eye	Gills	Rigor mortis
Clean (not cloudy)	Bright red	Present (+)

Diseases transmitted by fish:

- Fish tapeworm
- Vibrio parahaemolyticus
- Salmonella infections

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Milk – sources

00:10:28

	Buffalo milk	Cow milk	Human milk
Energy (Kcal)	117	67	65
Fat (gm%)	6	4.1	3.1
Protein (gm%)	4.1	3.1	1.1
Lactose (gm%)	4.4	4.8	7.8
Calcium (mg)	210	120	28

Breast milk

00:13:55

- Protein – ¼ of buffalo milk and ⅓ of cow milk
  - Low quantity but best quality
  - Rich in Cysteine and Taurine (conditionally essential A.A)
    - For premature children
    - For axonal growth
  - Rich in immunoglobulins IgA, IgG
- Fat – ½ of Buffalo milk
  - Low quantity but good quality
  - Rich in – PUFA (Poly Unsaturated Fatty Acid)
    - ALA (Alpha Linolenic Acid)
    - Linoleic acid
    - Arachidonic acid

    } for myelination
- Carbohydrate – Richest in lactose – for brain function, Lactobacillus bifidus (anti infective)
- Vitamin D – Water soluble form
- Maximum amount of vitamin C and A (among all milk)
- Maximum bioavailability 70% of iron due to ↓ Ca and ↑ vit C
- Zinc, copper, selenium (antioxidants)
- Low sodium – Nephroprotective

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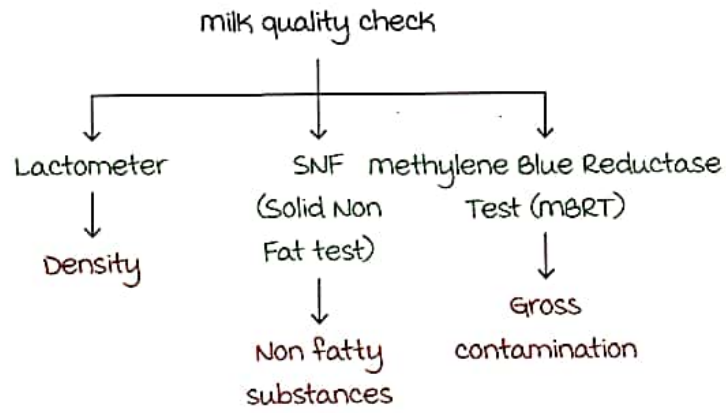
Milk hygiene and Pasteurization 00:20:58



Pasteurization 00:23:04

- High level of disinfection

Three methods

Vat / Holder method
- Rural areas
- Temperature ↑se to 66°C
- Hold for 30 min
- Cool

HTST (High Temperature and Short Time)
- Urban areas
- Temperature ↑se to 72°C
- Cool in few minutes

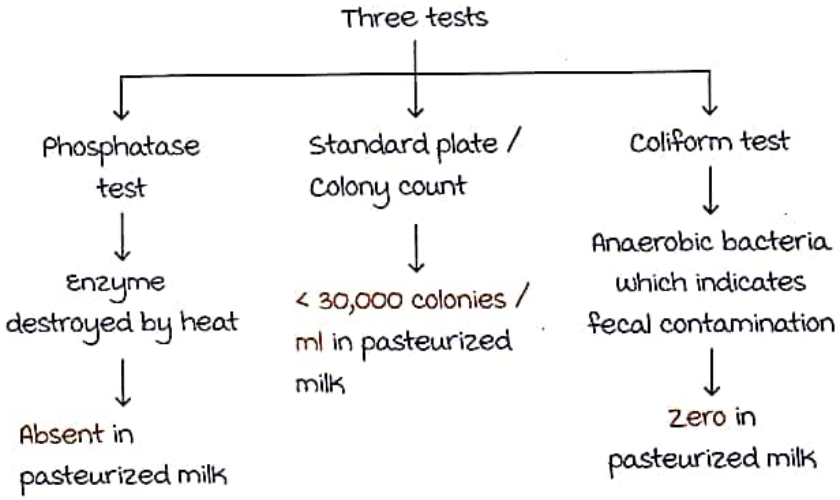
Flash method

UHT (Ultra High Temperature)
- Most modern and best method

Two phases
i) High temperature
- Temperature ↑se to 125°C
- Cool in few seconds

ii) High pressure

Check for Pasteurization



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Packaged milk 00:28:33

- Standard milk = Buffalo milk – Fat 6%
- Regular milk = Cow milk – Fat 4.5%
- Toned milk = Fat 3%
- Double toned milk = Fat 1.5%
- Skimmed milk = Fat < 0.5%

Homogenised v/s evaporated v/s condensed milk 00:29:58

Homogenised milk	Evaporated milk	Condensed milk
• Homogenise the fat molecules in milk • Better type of milk for young children	• 50% reduction in the volume of milk	• 25% reduction in the milk

Neurolathyrism 00:32:00

- Food intoxication
- Toxin – BOAA (Beta Oxalyl Amino Acid)
- Food product – Lathyrus sativus (Khesari dal)
- Clinical features – Neurological disease, affects, affects the joints Knee > Hip

C/F – Five stages

- **Latent**
  - Asymptomatic
  - Important stage for prevention (remove dal from diet)
- **No stick**
  - Jerky steps
  - Limping gait
- **One stick**
  - Clumsy gait
  - One stick used to walk
- **Two stick**
  - Two stick used to walk
- **Crawler**
  - inability to walk / Stand
  - Atrophy of thigh
  - bent knee

prevention methods:

- Steeping
- Parboiling with lime
- Vitamin C prophylaxis
- Avoid dal in diet

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Food adulteration diseases 00:36:14

i) Endemic Ascites:
- Toxin – Pyrrolizidine
- Food product – Crotalaria seeds (Adulterated with millets)
- C/F – Hepatotoxic
- Prevention method – Seaving, filtration

ii) Endemic dropsy
- Toxin – Sanguinarine (Argemone Mexicana)
- Food product – Mustard oil
- C/F – Glaucoma, congestive cardiac failure, pleural effusion, pedal edema and diarrhea
- Prevention methods – i) Deweed (before mixing with oil)
  ii) Nitric acid chromatography test

Food related fungal diseases 00:40:47

i) Aflatoxicosis: (storage fungus)
- Toxin – Aflatoxin secreted by Aspergillus flavus
- Food product – Any stored food in godown (grains, nuts, rice)
  m/c – ground nut
- C/F – Hepatotoxic, cirrhosis
- prevention methods – Increased ventilation, decreased moisture in storage place

ii) Ergotism: (Plant / Field fungus)
- Toxin – Ergot alkaloid
- Food product – Jowar, rye, sorghum
- C/F – Gastrointestinal toxicity
- prevention method – Float the plant in 20% salt solution

Food quality and standards 00:44:18

- FSSAI: (Food Safety and Standards Authority of India)
  → Autonomous body under ministry of health and family welfare
  → Started in 2006 (PFA ACT)
  → For food consumed orally

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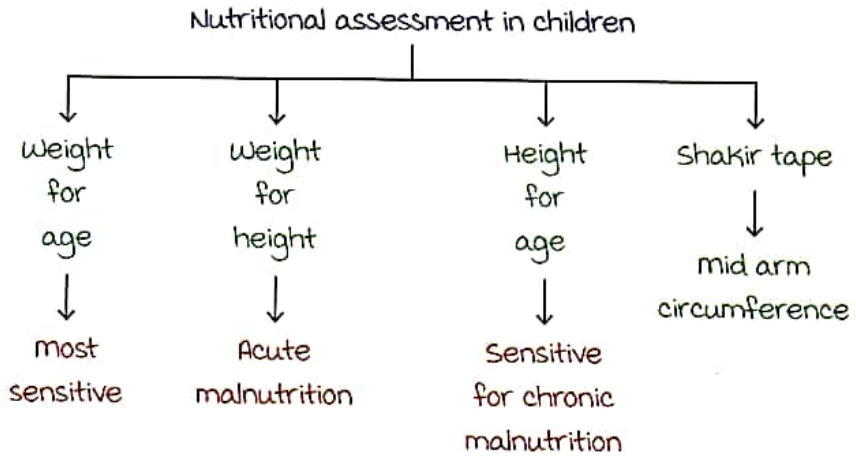
- Agmark
  → Not mandatory, not a law
  → Agriculture mark
  → For raw food, seeds, plants

- Codex alimentarius:
  → International standards for quality of food products

Nutritional surveillance and assessment 00:47:40



Biochemical tests used in nutritional surveys:

Nutrient	Normal value	Remarks
Vit A	20 mcg/dL	
Vit B7	6 mcg/ml	Serum folate
Vit B12	160 mg/L	S. B12
Vit K	11-16 secs	PT
Proteins	35 g/L	Serum albumin
	20 g/L	S transferrin
	250 mg/L	Thyroid binding pre albumin

- Serum albumin – most sensitive for protein estimation

Functional indicators:

Structural integrity	Erythrocyte fragility	Vit E, Selenium
	Capillary fragility	Vit C
	Tensile strength	Copper
Host defence system	Leucocyte chemotaxis	Protein energy, zinc
	Leucocyte phagocytic and bactericidal capacity	Protein energy, iron
	Delayed cutaneous hypersensitivity	Protein energy, Zn
Haemostasis	Prothrombin time	Vit K
Reproduction	Sperm counts	Zn, Vit E, energy
Nerve function	Nerve conductions	Vit B1, B12
	Dark adaptations	Vit A, Zn
	EEG	Protein energy
Work capacity	Heart rate	Iron, Protein energy
	Vasopressor response	Vitamin C

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SOCIAL MEDICINE AND HEALTH

Social medicine – Introduction 00:00:41

- Society
  - A group of individuals living as a community
  - They share common goals, culture and organisation
- Social structure
  - Pattern of relationship between individuals
- Community
  - People living together within a common geographical boundary
  - They share common interests
- Behavioral Sciences
  - Sociology: Study of Human behaviour and society
  - Psychology: Study of Human attitudes, thought and behaviour / Response
  - Anthropology: Study of human physical, cultural and social history of man

Sociology 00:04:32

- Socialization
  - Process of acquiring a culture
  - Promotes interaction
- Socialism
  - System of production and distribution based on social ownership
  - Political term
- Social Epidemiology
  - Social factors which lead to disease
- Socialized Medicine
  - Professional services in health is provided by the state
  - Political term

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- Social medicine
  - Study of social, political, cultural, environmental factors affecting diseases

- Social pathology
  - Study of social factors leading to social disease / Disharmony
  - Eg: Factors leading to crime, beggary, poverty, unemployment, Human trafficking, child abuse etc

Culture 00:09:27

- Culture
  - Acquired, learned way of doing things

- Acculturation
  - Mixing of 2 cultures
  - Can happen due to: → Trade
    → war/ Conquest
    → Industrialisation
    → Religious organisation(propaganda)
    → Education

- Customs
  - Established pattern for a society
  - Inherited
  - Folkways: Right way of doing things
  - Mores: Stringent Rules (Prohibitory)

- Traditions
  - Customs handed over from person to person

- Taboo
  - Prohibitions related to Human action

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Attitude

00:14:55

- Attitude
  - Expression of likes / Dislikes
  - Usually permanent
  - Is based on: → Prior experiences (learned)
    → Knowledge (cognitive)
    → Emotions (affect)
  - Is not affected by motivation
- Belief
  - Derived from close relations
  - Permanent, stable
- Opinion
  - Based on current evidence
  - Temporary
- Habits
  - Established way of doing things
  - Influenced by motivation
- Learning
  - Continuous
  - Permanent change in behaviour
  - Based on prior experience, cognition or affect
  - Can be conscious or sub conscious
  - Types: → Cognitive: Based on knowledge
    → Affective: Based on emotions, attitudes
    → Psychometer: Learning a skill

Social definitions

00:22:18

- Social mobility
  - Transitions across socio- economic statuses of the society
- Social stress
  - Usually seen in transitional society
  - Uncertainity for younger population (↑ diseases)

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- Social security
  - Sense of security by society for risk management
  - Eg: unemployment, disability, severe diseases etc.
  - Social security in India:
    → Workmen's Compensation Act,1923
    → Central Maternity Benefit Act,1961
    → Employees State Insurance Act,1948
    → Family pension scheme,1971
    → Social security for civil Servants (central and state government)
    It includes Pension, Gratuity, Provident fund and family pension Schemes
    → Social security for general public comprises of Insurance Scheme (LIC, PPF)

- Social defence
  - Preventive, therapeutic and rehabilitative services to promote a healthy amd wholesome growth of Society.
  - To oppose beggary, delinquency, trafficking etc.

Theories in sociology 00:28:49

Human needs
- Biological: Food, Water, shelter, clothes
- Social : Love, affection, education
- Economic: Money
- Ego centric (Ego Integrated): Power, Self-respect

- Marxist Theory
  - If profit is valued more than health, ↑chance to contact a disease
  - Economic cause of disease

- Parsonian Theory
  - Social stress (to meet demands of social roles) causes disease

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- Foucauldian theroy
  - Associates disease to power and political influences
  - 'Diseases are labels to segregate population'

- Feminist Theory
  - Disease is caused by social role enforced on women by patriarchal men

Group dynamics 00:36:33

Temporary Groups

- Crowd : Common interest, no leader
- mob : Emotionally charged, with a leader. Promotes violence
- Herd : Blind followers , with a leader

Permanent Groups

- Band: small number of families living together
- Village:
  - Collection of families (>20) → Own houses
  - Agriculture as main source
  - Strong culture

- Town / cities
  - Urban area
  - Dense population
  - Divided into strata

Family cycle 00:40:56

Family

- Group of biologically related individuals who share a common kitchen
- most powerful example of social cohesion

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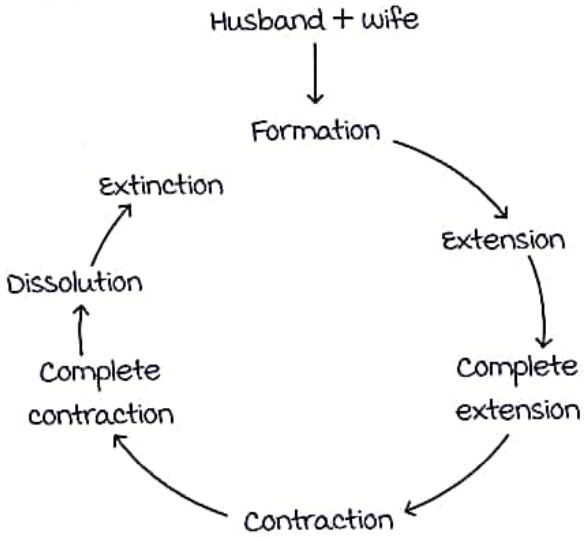
Family cycle



Family Types:

- Nuclear: Father, mother and children
- New family: A family less than 10 years old
- Three generation family: where grandparents, parents and children are living
- Joint family: where grandparents, parents, children are living with uncle, aunt and their families
- Broken family: Both parents are not together
- Problem family: A family which lags behind socially

Health economics

00:45:40

- Gross National Product (GNP): Total home income + abroad income
- Gross Domestic product: Home income (domestic)
- Net National product: GNP – Expense (capital consumed)
- Purchasing Power parity:
  - Bag filling phenomenon (How much of a bag can be filled with same amount of money in a different countries)
  - Good indicator → Tells about development of a country
- Poverty line:
  - Divides people into above poverty line (APL) and below poverty line (BPL)

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- Concept was introduced in India by → Tendulkar committee
  → Rangarajan committee

- In India (2018):
  - A person is considered BPL if the person can't afford:
    → Calories : 2100Kcal (rural) or 2400 Kcal (urban)
    → Money : 32/ day (rural) or 47/ day INR (urban)

Socio- economic indices / social stratification 00:50:37

- Urban:

1. Kuppuswamy scale
   - measured in 3 categories 1) Income : 1-12
     2) Education : 1-7
     3) Occupation : 1-10
   - Value ranges from 3 → 29

Table 1: Occupation of the head of the family

S.No.	Occupation of the head	Score
1	Legislators, Senior officials & Managers	10
2	Professionals	9
3	Technicians and Associate professionals	8
4	Clerks	7
5	Skilled workers and shop & market sales workers	6
6	Skilled agricultural & Fishery workers	5
7	Craft & Related trade workers	4
8	Plant & Machine operators and assemblers	3
9	Elementary occupation	2
10	Unemployed	1

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Table 2: Education of the head of the family

S. No.	Education of the head	Score
1	Profession or Honours	7
2	Graduate	6
3	Intermediate or diploma	5
4	High school certificate	4
5	Middle school certificate	3
6	Primary school certificate	2
7	Illiterate	1

Table 3:

Updated monthly family income in Rupees (2019)	Score
≥78,063	12
39,033 – 78,062	10
29,200 – 39,032	6
19,516 – 29,199	4
11,708 – 19,515	3
3,908 – 11,707	2
≤3,907	1

Table 4: Kuppuswamy's socio-economic status scale 2019

S. No.	Score	Socioeconomic class
1	26–29	Upper (I)
2	16–25	Upper middle (II)
3	11–15	Lower middle (III)
4	5–10	Upper Lower (IV)
5	< 5	Lower (V)

2. Shrivastava scale

- Rural

Grade	Category	Score
I	Upper class	> 43
II	Upper middle class	33 – 42
III	middle class	24 – 32
IV	Lower middle class	13 – 23
V	Lower class	< 13

1. Uday pareekh scale

Parameters:

1) caste
2) Occupation
3) Education

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4) Land

5) Social participation

6) House

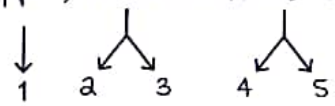
7) Farm power

8) Material possessions

9) Family members

2. Radhokar scale

- BG Prasad scale
- Based only on income
- Divides into upper, middle and lower classes



Revision of the Prasad's social classification for the year 2019	
Social class	Revised for 2019 (in Rs./ month)
I	7008 and above
II	3504–7007
III	2102–3503
IV	1051–2101
V	1050 and below

Wealth Index

- Based on income
- Based on quintiles (1/20th of the population)

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AIR AND METEOROLOGY

- A healthy life requires ~ 3000 cubic feet of air

Air pollution 00:00:46

- Types:

A. Primary air pollution

- Caused by gases
- CO, CO_2, SO_2, CH_4, CFC, NO_2, Radon
- Most hazardous gas causing 1° pollution: CO – indoor air pollution
- Most important gas responsible for global warming: CO_2
- Test done for co monitoring: Kiffer Test
- Most important gas responsible for industrial air pollution: SO_2
- Important gases responsible for skin cancer: Radon, O_3

B. Secondary Air Pollution

- Caused by dust, smoke.
- Dust (particulate matter) can be measured using Grit index
- Smoke can be measured by soiling index
- A composite indicator of both Grit and soiling index → Cohaze (coefficient of Haze). It combines all secondary air pollutions

Air comfort indices 00:05:41

1.Temperature

- measured using a Thermometer

2.Humidity

- measured using a psychrometer or Hygrometer
- NOTE: Hydrometer tells about particulate matter (specific gravity) in water

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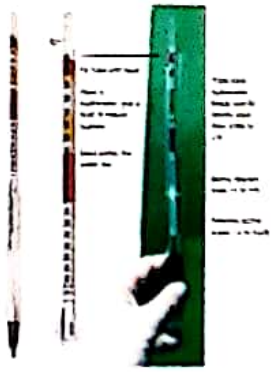
Sling Psychrometer Asman psychrometer Hydrometer



3. Air movement

- Measured using an Anemometer / venturimeter

4. Radiant Heat

- Measured using a Globe thermometer

- Cooling power of Air

- A composite indicator, which governs the basic principles: Temperature, humidity and air movement.

- Measured using a Kata thermometer

- Effective Temperature

- A combination of air temperature, air humidity and air movement

Corrected Effective Air Temperature (CET)

- A combination of air temperature, humidity, air movement and radiant heat

- Best indicator

Globe Thermometer

Kata Thermometer

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Corrected effective temperature (CET)

- measured using Mc Ardles index
- A technique to calculate Mc Ardles index → P4SR (predictable 4 Hours sweat Rate)
- McArdle index values and corresponding zones:

  <1 → Very comfortable zone

  1-3 → Just comfortable zone

  3-4.5 → Just tolerable zone

  >4.5 → Not tolerable

- Heat Stress Index (HIS)

- A method to measure thermal comfort.
- Heat stress index

$$= \frac{\text{Evaporation required to maintain heat balance}}{\text{Amount of maximum evaporation in that environment}}$$

- HSI ranges from 0 to 100.
- HSI values and indications:

  0 → No thermal stress

  10-30 → mild to moderate

  40-60 → severe heat strain

  70-90 → very severe heat strain

  100 → Not tolerable

Humidity 00:20:31

- Types:

A. Absolute humidity

- Amount of water vapour in air
- Expressed in gm/m^3

B. Relative humidity

Given by,

$$\frac{\text{Amount of water vapour present in air}}{\text{Amount of water vapour which can be maximally carried (Maximum capacity)}} \times 100$$

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- Expressed as percentage
- It: < 35% → Dry
  > 65% → ↑ perspiration (sticky skin)
  35–65% → Preferable range of relative humidity
- Change of relative humidity (RH):
  - By cooling, RH ↑
  - By heating, RH ↓
  - By changing the water vapour content

Air pollution monitoring 00:23:27

- Biological indicator : Lichen
- Important indicator of air pollution: SO_a
- measurement of suspended particulate matter: Grit index
- Indicator for 2° air pollution: Cohaze
- Air pollution index: Composite indicator containing different parameters
- In India is done by CPCB (Central Pollution Central Board)
- Kyoto protocol
  - Signed by various countries to ↓ greenhouse gases
  - Under UNFCCC (United Nations frame work convention for climatic charge
- Paris agreement
  - Agreement for international air quality control
  - To ↓ CO_a emission to control global worming

Disinfection of air: 00:28:03

- Methods
  - Mechanical disinfection : ↑ Ventilation Eg: TB lab
  - Chemical disinfection : → Formaldehyde fumigation
    Eg: OT rooms, infectious dissease wards,
    → Triethylene glycol
  - Other methods : UV radiation

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WATER AND DISEASES – I

Norms of water supply 00:00:40

- Requirement of drinking water per day
  - Adult: 3.7–4 L
  - Child: 1.3 L
- Amount of water supplied by the government
  - Rural area: 40–50 Liters per capita per day (LPCD)
  - Urban area: 150–200 LPCD (with sewage supply)

Sources of water 00:02:23

1. Rain water
2. Surface water
   - Streams, rivers, seas, oceans, tanks, canals etc
   - Impounding reservoirs (Big depressions on earth; rainwater collected)
   - Catchment Areas (areas where water is blocked and stored in dams)
3. Ground water
   - Wells
   - Springs

Wells 00:04:43

- Types:

1. Kutcha well (no brick lining) / Pucca well (with brick lining)

↓

20 m deep lining

   - Not a sanitary well

2. Step wells
   - ↑ chance of contamination

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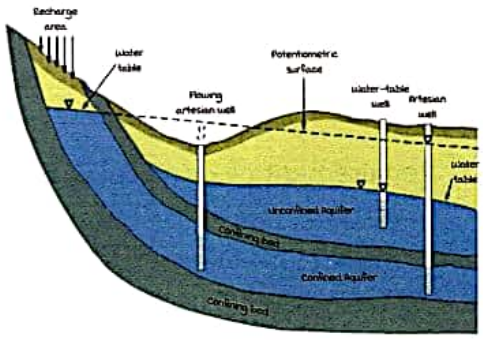
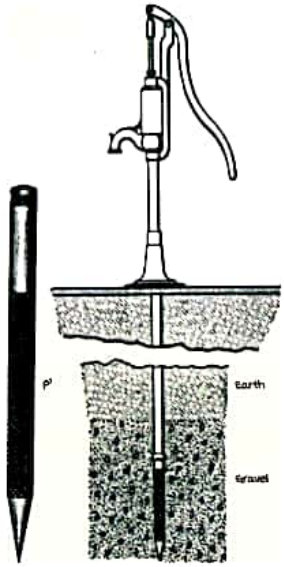
3. Artesian wells
   - Naturally occurring
   - Not very common in India



4. Shallow wells
   - Above the 1st impervious layer
   - Driven tube wells



5. Deep wells
   - Below the 1st impervious layer
   - Strainer type tube wells

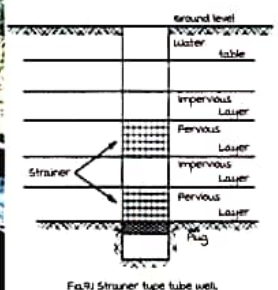


Fig.9J Strainer type tube well.

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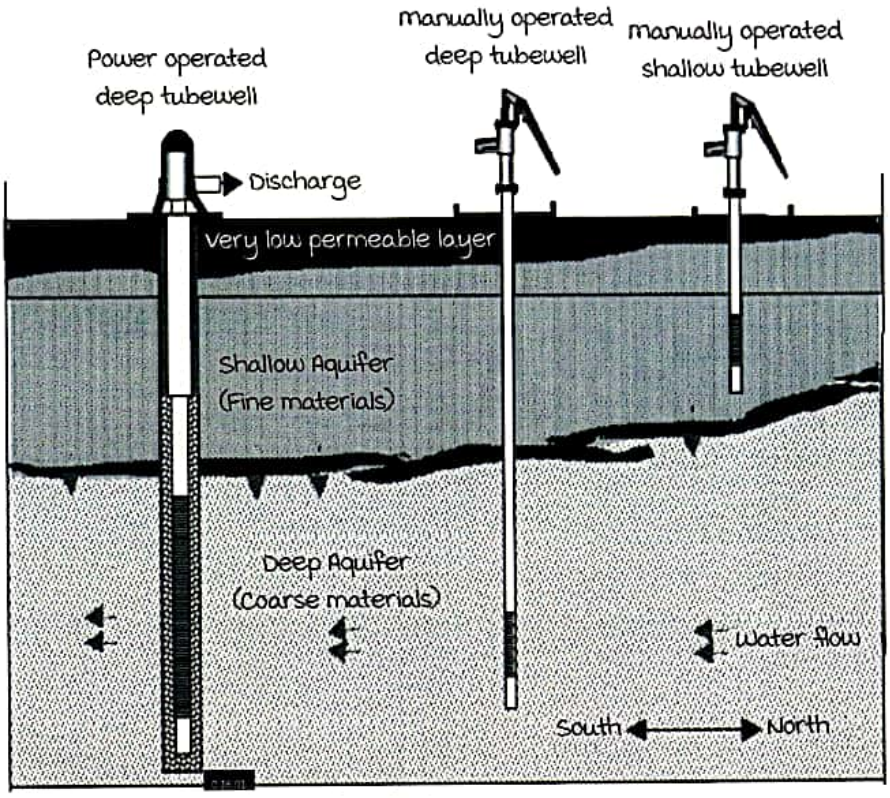
Wells

Shallow
- Subsoil (above 1st impervious layer)
- Water is moderately hard
- ↑ level of contamination
- May dry up in summer
- Common in India

Deep
- Deeper (below 1st impervious layer)
- Water ranges from hard–very hard
- Very low contamination
- Constant supply
- Less common



- Components of a sanitary well
  - > 15 m away from contamination source
  - > 50 m away from toilets
  - < 100 m from houses
  - < 30 min of walking distance

- Sanitary well
  - Has a cover
  - 2.5–3 feet lining
  - 1 m (~ 3 feet) long platform

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Purification of water

00:16:41

- The health department is responsible for maintaining the quality of water

I. Purification on Large scale

1. Storage
2. Filtration
3. Disinfection

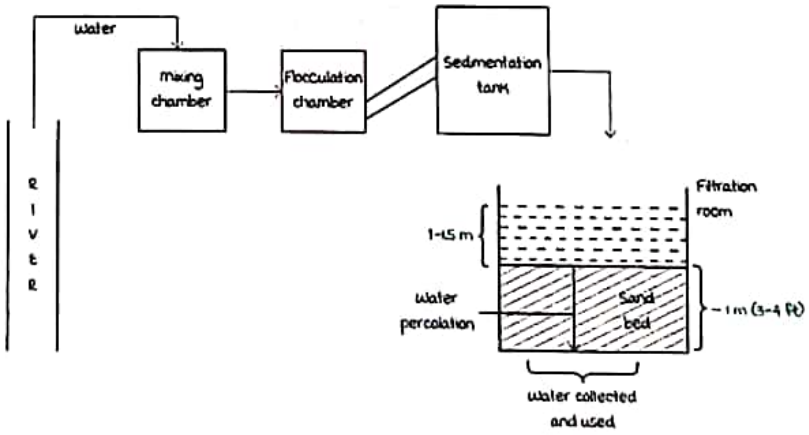
1. Storage

- Advantages:
  - Decreases the impurities by 90%
  - Decreases the bacterial load by 90%
  - Decreases the amount of ammonia and nitrates
- Proper storage time: 10-14 days
- Permissible Storage time: 5-7 days

Filtration

00:20:42

I. Rapid sand filters



- Mixing chamber
  - Usually alum is mixed (5-50 mg / L)
- Flocculation chamber
  - Turbines / Fans at the bottom of the chamber
  - Churning of water → 30 min
  - Scum / Froth settles at bottom, so an elevated outlet is made
  - As a result only water moves to next tank
  - Should be cleaned often (due to scum accumulation)

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- Sedimentation Tank
  - Acts as reservoir
- Based on removal of water from sedimentation Tank, rapid sand filters are of two types:
  - By pressure → Candy type Rapid Sand Filter
  - By gravity → Paterson type Rapid Sand Filter
- Loss of Head of Water
  - H means the filter is choked, and should be cleaned
  - Filter is cleaned by Backwash (Technical; ↑ frequently)
  - Allowable loss of Head → 6–8 ft
- Gravel size of sand Bed → 0.4–0.7 mm
- The heart of rapid sand filter: Filtration Room
- Filtration Rate: 5–15 m^3 / hr / m^2 of sand bed

2. Slow Sand Filters
   - Height of water: 1–1.5 ~ 2 m
   - Size of sand gravel: 0.2–0.3 mm
   - Weight of the sand bed: 1m
   - Flow of water is controlled by a venturimeter
   - The heart of slow sand Filter: Biological layer / Zoological layer / Vital layer / Schmutzdecke layer
   - Permissible loss of head: ~ 4 ft
   - Cleaned by scrapping (Non Technical; not frequently)
   - Filtration rate: 0.1–0.4 m3 / hr / m2 of sand bed

	Rapid sand filter	Slow sand filter
Space		
Rate of filtration	200 mgad	2–3 mgad
Sand gravel	0.4–0.7	0.2–0.3
Preliminary treatment	Chemical + Sedimentation	Sedimentation
Washing / Cleaning	Backwashing	Scrapping
Loss of head	6–8 ft	4 ft
Purity	99%	99.99%

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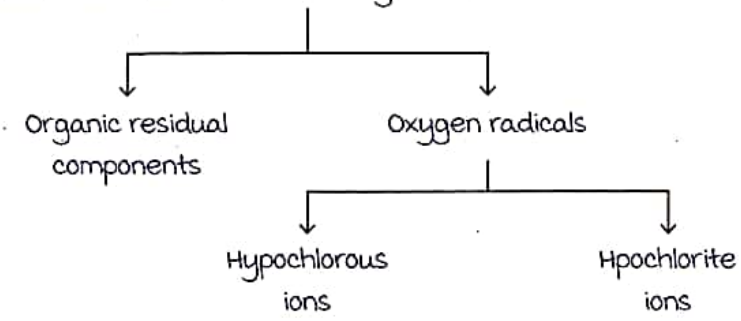
Disinfection – chlorination

00:37:52

- Adding chlorine to water gives chloramines (ammonia + chlorine)
- On further addition of chlorine, when Break point Chlorination (BPC) is achieved chloramines disintegrates into



- Any chlorine which is added further goes as Residual chlorine or as Free chlorine
- Most important free radical: Hypochlorous ions

- Chlorine Demand
  - Determines the amount of chlorine to be added to water to disinfect
  - Given by:
  = (Amount of Cl^- added to H_aO) – (Amount of Residual Cl^-) after BPC after 1 hr contact time
  - Calculated using Horrocks Apparatus

- Horrocks Apparatus
  - Chemical indicator for chlorine: Starch iodine
  - Process: Bleaching powder is mixed with water to form a paste. Its then added to different samples of water. Colour change in any sample tells the amount of bleaching powder to be used

- Addition of chlorine can be done by
  - Bleaching powder → 33% free Cl^-
  - Perchloron (High Test Hypochlorite solution) → 66% free Cl^-
  - Cl^- gas

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- Checking Cl^- levels:
  - Using Chloroscope / Chlorimeter (checked within 1 min)
  - Reagent: Orthotolidine (free and combined chlorine)
  - Tests: → Orthotolidine Test
    → OT-A (Orthotolidene Arsenate) → Free and residual Cl^- separately
- Level of Cl- in water: 0.5 ppm after contact time of 1 hour
  - In case of disasters : 0.7–0.9 ppm
  - In case of swimming pools : > 1 ppm

Chloroscope →

Disinfection-other methods 00:52:53

- Ozonisation
  - O_3 gas used as a good disinfectant
  - Water stream is passed through dry air under high voltage
  - Normal: > 0.5 mg/L for contact time of 20 min
  - Ideal ozonisation: > 2–5 mg/L
  - Advantage: In chemicals, pesticide contamination
  - Disadvantage: No residual effect
    Combine with filtration
    Combine with Reverse osmosis

- Membrane Processes
- When a semipermeable membrane is placed normally the solvent goes from less concentration to High concentration

If Pressure is ↑ in High concentration → Reverse osmosis

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- Types

High Pressure processes
- Reverse osmosis
  - Semi permeable membrane < 0.002 µm (smallest pore)
  - Pressure: 5–15 bars
  - Very good in solutions with ↑↑solute load: Sea / Brackish
- Nano filtration
  - Pore size (0.001–0.01) µm
  - Pressure: 4–6 bars
  - Good for organic compounds with micro organisms

Lower Pressure Processes
- Ultra filtration
  - Pore size: 0.003–0.002 µm
- Micro filtration
  - Pore size: 0.01–12 µm
  - Preliminary treatment

Purification on small scale 01:00:42

1. Disinfection of wells
- MC used agent: Bleaching powder (BP)
- Chlorine demand is calculated after calculating volume of H_aO
- Usually 2–3g of Bleaching powder is used for 1000 L water
- In outbreaks / Field / Emergency situations: Double pot method is used
  - 2–3 weeks
  - ~ 4500 L of H_aO
  - ~ 350–450 L / day

2. Household Purification of water

(i) Boiling
- Should be done for 10–20 min: Roll Boiling
- Cumbersome, expensive

(a) Chemical Disinfection

a. Bleaching powder → 33% free Cl^-

b. Chlorine solution → (4 Kg BP → 20 L of H_aO) 5% Cl^- solution

c. High test hypochlorite solution → Perchloron: 66%

d. Chlorine Tablets → Halazone, NEERI tablets (MC) → [0.5 g in 20 L]

e. Iodine → 2% Ethanol solution of iodine → 20 L

f. Pottassium permanganate → Alters taste / Odour

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3. Household filters

- Katadyn filters
- Pasteur chamberland filters
- Berkefeld Filters

4. UV radiations

- UV lamp → 254 nm λ
- Contact time: 20–30 min
- For chemical contaminations

5. Multistage RO filters

RO system

- stages / levels
  1. Sediment filter – stops particulate matter
  2. Carbon block filter – stops chemical and organic compounds
  3. GAG filter – alters taste / odour / filter
  4. RO membrane – size : 10^{-3} – 10^{-4}
  5. Taste enhancer / mineraliser

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WATER AND DISEASE – II

I. Water quality parameters

II. Water and disease, Programs for water and sanitation.

Water quality parameters 00:00:35

a) Physical b) Chemical c) Biological and radiological

a) Physical parameters:

- Colour – Ideal : < 5 true colour units (TCU)
  Not acceptable: > 15 TCU
- Temperature – Room temperature
- Turbidity – ideal : < 1 Nephalometric unit (NU)
  Visible to eyes : > 4 NU
  Maximum : < 5 NU
- Odour – Odourless

b) Chemical parameters:

- Chlorine: > 0.5 ppm after contact period of 1hr
- Chloride : Ideeal – < 250 mg / L
  max – < 600 mg / L
- TDS (Total Dissolved Solids) : < 500 – 600 mg / L
  maximum : < 1000 mg / L

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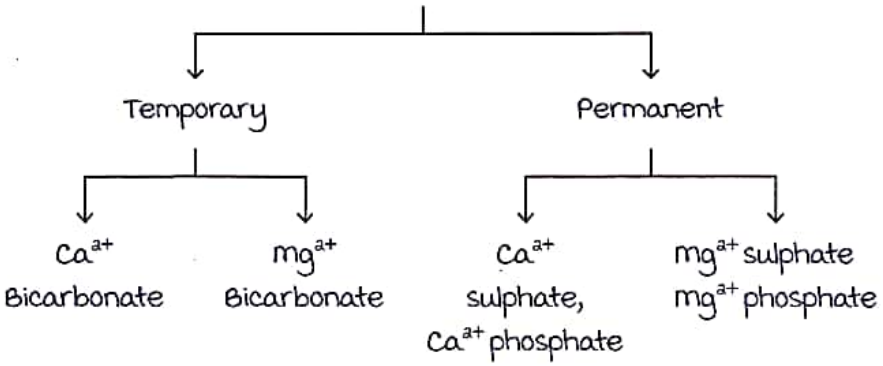
- Hardness:



- 1 mEq of hardness = ~ 50 mg Calcium Carbonate
- Levels of hardness: < 1 mEq = Soft
  1-3 mEq = Moderately hard
  3-6 mEq = Hard
  >6 mEq = Very hard
- Hardness of a drinking water should be 1-3 mEq
- Acceptable amount of $CaCO_3$ is 50 -150 mg / L

Treatment of hard water:

- Boiling - Effective method
- lime
- Sodium bi carbonate
- Sodium Zeolite (sodium, aluminium, silica) - $Na_aAl_aSi_a$

Optimum - pH	7.5 (Range of pH = 6.5 to 8.5)
Total disolved solids (Affecting turbidity)	< 500-600 mg/L (Maximum permissible till 1000 mg/L)
Total hardness	3 mEq/L (1 to 3 mEq/L of CaCO3) (50 to 150 mg of CaCO3/L)
Iron	0.3 mg/L
Calcium	75 mg/L
Sulphate	200 mg/L
Chlorides	250 mg/L (Taste alter > 250 mg/L, maximum permissible < 600 mg/L)

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Zinc	5 mg/L
Copper	0.05 mg/L
Manganese	0.05 mg/L
Phenolic substances	0.001 mg/L
Ammonia	1.5 mg/L (Ideal < 0.2 mg/L)

Other chemical properties 00:11:43

(i) Nitrates and Nitrites

- Permissible limit of nitrate is ~ < 50 mg/ L
- Permissible limit of nitrite is ~ < 3 mg / L
- Ratio of nitrate and nitrite concentration in water is given by
- Concentration index

$$= \frac{\text{Concentration of nitrate}}{\text{Guideline value of nitrate}} \times \frac{\text{Concentration of nitrite}}{\text{Guideline value of nitrite}}$$

- Normal concentration index is ≤ 1

(ii) Lead

- Permissible limit of lead is < 0.01 mg / L
- Level of lead is important because
  * It can cross placenta ⇒ congenital defect
  * Renal tumors
  * Blood cancers

(iii) Fluoride

- Permissible limit of fluoride is 0.5 – 0.8 mg / L
- Upper limit is 1.5 mg / l
- Dental Caries if < 0.5 mg / L
- Fluorosis if > 1.5 mg / L . It can be treated by defluoridation by using Nalgonda technique.

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Leave Feedback

- Units used in chemical parameters of water:

- TDI : Tolerable Daily Intake

  The amount of substance which can be taken daily without any adverse effects

- ADI : Acceptable Daily Intake

  The maximum amount of substance which can be taken

- NOAEL: No Observed Adverse Effect Level

  The highest dose which does not cause any adverse effect

- LOAEL: Lowest Observed Adverse Effect Level

  The lowest dose which causes adverse effect

Biological and radiological parameters of water 00:14:35

Biological parameters:

(i) Colliform count (E-Coli)

- To check for fecal contamination
- also known as McCartney chart/multiple tube method/ most probable number method
- method: take a total of 25 tubes with different concentrations of water

  ↓

  Add liquid bile broth and incubate for 24 hours

  ↓

  Check for colour and gas

- Colour of contaminated water: Pink
- Inverted Durham's tube: To check gas in tube
- Colliform count is the most sensitive and best method to check fecal contamination

(ii) Eijkman's test: To rule out Klebsiella (in suspected cases)

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Other indicators of fecal contamination:

- Fecal streptococci: Indicates recent/ nearby contamination
- Clostridium perfringes: Indicates remote/ distant contamination

- Radiological parameters of water

α = < 0.5 Bq / L of water, β = < 1 Bq / L of water

Swimming pool sanitation 00:25:13

An ideal swimming pool should have

- area : > 24 sq. ft / swimmer
- Water replacement: > 15% of water should be replaced daily
- Chlorine : > 1 ppm
- pH : 7.4 to 7.8

Inbuild rapid sand filter (RSF): has capacity to clean water within 6 hours

Water and diseases 00:26:50

(i) Water borne : Acute G-E, Salmonellosis, Cholera

(ii) Water washed : Conjunctivitis, Scabies, Polio, Typhoid

(iii) Water related : Malaria, Dengue, Japanese Encephalitis, Trypanosomiasis, Onchocerciasis

(iv) Water based : Schistosomiasis, Dracunculiasis

Swajaldhara 00:29:17

- Swajaldhara ensures
  - Safe water supply
  - Water management
  - Sanitation

- 2 levels

  I – Community level (Gram panchayat)

  II – District level

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- Ideal water supply should be
  - Within 100 meters from the house
  - Within 30 mins of walk
  - Single water source must supply 200-250 population

Problem village:

- No water source 1.6 kms
- Water depth: > 15 meters
- Gross- biological / radiological / chemical contamination

Chlorine of water:

- Normal - > 0.5 ppm
- Outbreak - 0.7 to 0.9 ppm
- Problem village -~ 2-3 ppm

Warka 00:33:35

- Extraction of water from air at night by the collection of dew drops utilizing clothes in water scarce areas
- Used in Maharashtra and Madhya Pradesh.

Disclaimer

- These Notes do not cover all the points, especially conceptual points, discussed in the videos. The information in this book is meant to complement Marrow videos and should be used in conjunction with the videos. Special emphasis on certain points and MCQ solving approach has to be understood from the videos only.

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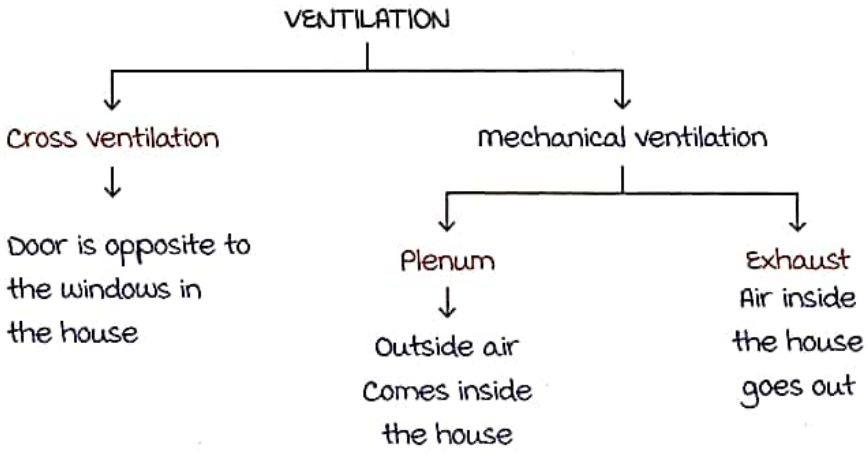
HOUSE, LIGHT, SOUND & RADIATION

Housing & ventilation

00:00:13



For healthy life → 2-3 times air changes per hour

HOUSE:

- >15 metres away from the road
- Outer wall of the house: 9"
- Root of the house >10 feet
- Size of the room: >100 sq feet per person
  Should not be < 50 sq feet
- Every house should have 2 rooms (recommended), door, preferably 2 windows (at least one window)

- Window ⇒ $> \frac{1}{5^{th}}$ of floor area
- Door ⇒ $> \frac{1}{5^{th}}$ of floor area

} $> \frac{2}{5^{th}}$ of floor area

- The height of the window ⇒ 3 feet from the ground
- Cattle: > 25 fts from the house

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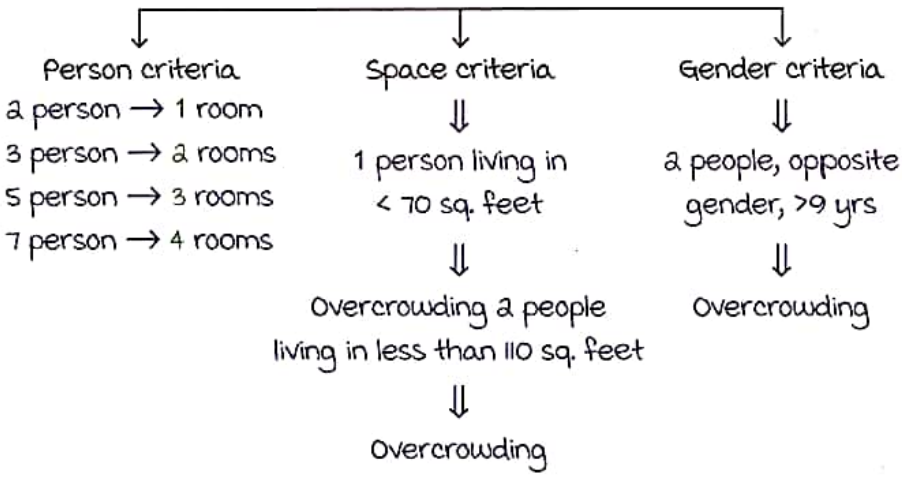
Overcrowding

00:05:26



Light

00:07:30

- Reflection factor:

For Ceiling, roof → 80%
Walls → 50–60%
Furniture → 20–40%
Floor → 15–20%

For healthy living,

- Any sharp shadows
- Glare

} Should be absent

- Light source should be steady

Measurement of light

00:09:09

Variable	units	
1. Luminous intensity	Candela/candle power	Power of light
2. Luminous flux	Lumens	Flow of light
3. Illumination	Lux	Amount of light reaching The surface

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4. Brightness/ luminance	Lambert	Amount of light reflected/reemitted
5. Day light measure	Day light factor	$df = \frac{\varepsilon_{in}}{\varepsilon_{out}} \times 100$ Expressed in %

Df: <2% ⇒ dark room
>5% ⇒ well-lit room
>8% ⇒ Kitchen
>10% ⇒ drawing room

ε_{in} ⇒ Illuminiscence inside
ε_{out} ⇒ Illuminiscence outside

Artificial lighting

00:13:02

1. Direct light: 99% direct light
2. Semi direct light: 10-40% projected, rest → Direct light
3. Semi indirect light: 60-90% projected
4. Indirect light: 90-99% projected light
5. Direct-indirect light: 50% direct and 50% projected light

2 types of sources that are used:

	Filament	Fluorescent
• Light	5%	20%
• Heat	95%	80%

Sound

00:16:15

Intensity of sound measured in Decibels (dB)

Frequency of sound measured in Hertz (Hz)

↓

Whisper : 20-30 dB
Talking : 60-65 dB
Street : 60-80 dB
Industries : >100 Db

1 wave / second
(humans can hear 20Hz -20000 Hz)

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Leave Feedback

Recommended noise levels:

Residential area	: <40 dB
Commercial area	: 40-60 dB
Office	: 35-45 dB
Hospital	: <40 dB
Class/school	: 30-40 dB

LA max: Level of sound with frequency weight adjusted

LA equivalent: For steady sound

LSEL: Level of sound for single exposure noise

Phon: Psychoacoustic unit of noise

dB & Hz together

Recommendation for healthy living:

Hearing loss:

Mild	: 25-40dB
Moderate	: 40-60dB
Severe	: 60-80 dB
Profound	: >80 dB

Radiation 00:24:12

Types

1. Natural radiation

- Cosmic → 30m Rad/yr
- Atmospheric → ~ 3m Rad/yr
- Environmental/ Terrestrial
  ↓
  ~ 50-1000 m Rad/yr
- Internal radiation ~ 0.1m Rad/yr

manmade radiation

- x-ray → 0.2-3 Rad
- Fluoroscopy → 4 Rad

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Ionising radiation	Non ionising radiation
α, β, γ, X rays	Longer wavelength
↓ ↓	UV < Light < Infrared
• most harmful • Shortest wavelength	< Microwave < Radiofrequency
• maximum wavelength	

Radiation units:

1. Unit of radiation activity → Becquerel (Bq)
   1 Bq = 1 disintegration/sec

2. Roentgen = coulombs/kg: Amount of radiation in air (C/kg)

3. Rads = Gy: Amount of radioactive energy absorbed
   1 GY = 100 rads

4. Rem/sievert = Radiation absorbed + modifying factors
   1 sievert (Sv) = 100 Rem

Dose equivalent:

Dose (Gy) × Quality factor

↓

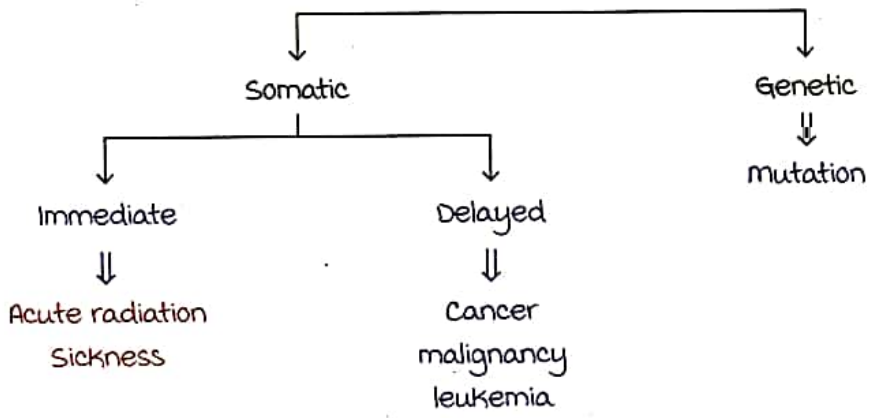
β, γ, X ray → 1

Neutrons → 10

Alpha → 20

Effects of radiation

00:32:44



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Permissible levels of radiation: <5 Rads

<5 Rad/yr : No observable effects

5–50 ⇒ Slight blood changes

>50 ⇒ Symptoms

50–100 ⇒ Nausea, vomiting, acute blood cell changes

>150–1000 ⇒ Intense symptoms + blood changes
Death in 2 weeks

>1000 ⇒ 100% death within 7 days

Wearing lead aprons ⇒ ↓ Dose of X-Rays by >90%

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WASTE AND SEWAGE DISPOSAL

Waste management 00:00:09

- Municipal corporation waste

Types

Solid	Liquid
- Garbage: Kitchen waste Organic waste	- Sullage: Liquid waste without fecal matter 'Grey water'
- Rubbish: Household waste Non-Organic waste	- Sewage: Liquid waste with fecal matter 'Black water'
- Ash	

Solid waste disposal methods 00:02:40

- Dumping
  - most insanitary
- Control Tipping
  - Most suitable if land is available
  - Can be of 3 types:

    1. Trench method
       - Depth : 2-3m
       - Length : 4-12m
       - Population: 10,000
       - Area :1 acre

    2. Ramp method
       - Only possible in hilly terrains

    3. Area Method
       - Natural depressions are used, filled with refuse
       - 12 inch of soil is added to the refuse every time
- Incineration
  - Burning in very ↑ temperature (> 1000°c)
  - Disposing every municipal waste by this method is not practically possible

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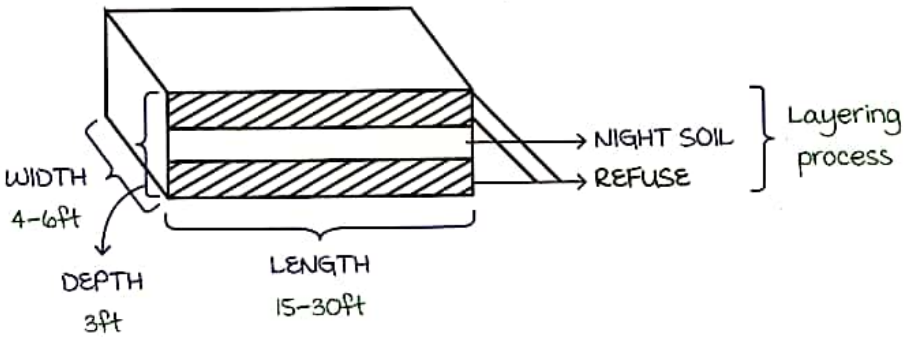
- Composting
  - Combined refuse + Sludge / Night soil
    ↓
    Humus
  - Can be done using Bangalore method:
    → A trench is made: 3 × 4 – 6 × 15 – 30 ft



→ Layering process → Anaerobic digestion of Night soil
→ Formation of Humus takes 4–6 months
→ Ratio of Night soil to Refuse = 1:3 (2 inches : 6 inches)
→ Heat production over days: > 60°c

- manure pits
  - In rural areas
  - 2 pits are used

- Burial
  - Pit size = Length x width (1.5m) x depth (2m)
  - If the length is taken as 1m, this can be effective for 200 people for 7 days

- mechanical composting
  - Refuse undergoes Pulverisation (shredding)
  - Its then mixed with previous compost or night soil or excreta → Compost
  - Done under strict pH, moisture, temperature levels

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Liquid waste types 00:14:29

- 2 Types
- Sewage: → Fecal waste
  → Amount of fecal matter excreted by an average Indian per day: 100-140g / day
- Sullage

- Strength of sewage

1. Biological O_a Demand
   - Amount of O_a required by excreta (in 5 days) at temperature of 20°C → Aerobic digestion
   - Values:
     < 100mg/L → Weak sewage
     100-300mg/ L→ Moderate sewage
     > 300mg/L → Strong sewage

2. Chemical O_a Demand
   - Pure oxidising agent is used
   - Chemical toxins are used with excreta

3. Suspended solids
   - Normal amount in sewage: 100-500mg/L (~ ppm)
     <100mg/L → weak sewage
     >500mg/L→ strong sewage

Excreta disposal methods – unsewered area 00:18:31

- Service Types: Night soil collected by Humans
- Non service type

1. Bore Hole
   - Old, not used anymore
   - Width : 12 inches
   - Length : 4-8 m ~ 20ft
   - 5-6 people / year

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Leave Feedback

2. Dug Well
- Width: 30 inches
- Length: 10–12 ft (3–4m)
- 5–6 people x 5 years
- Also known as Pit Latrine

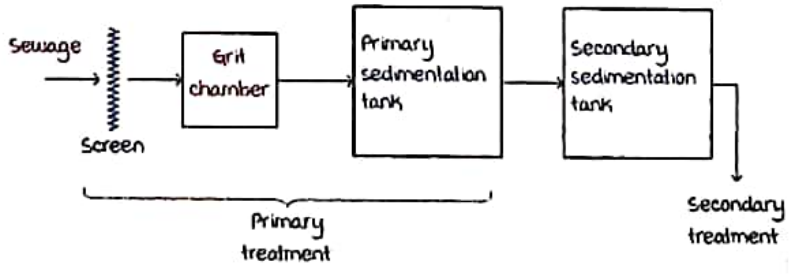
3. Sanitary Latrine
- Types:
  - Planning Research and Action Institute (PRAI) Latrine
  - Research cum Action project Latrine
  - Sulabh Sauchalya
- Squatting plate (3ft x 3ft)
- Trap: water level → 2.5cm. It makes it sanitary
- Pipe: 3-inch x 3ft

4. Septic tank
- Minimum capacity > 500 gallons
- Anaerobic digestion inside septic tank
- Aerobic digestion outside septic tank
- Depth → 5–7ft
- Length → 2x width
- For a new septic tank → Seeder (sludge from another functioning septic Tank)
- Distance from water surface to top of tank → 1–1.5m

5. Aqua privy
- Has complete water
- Anaerobic digestion of fecal matter
- Distance from water surface to top of tank → 1–1.5m

Excreta disposal methods – sewer facility 00:31:30

- Sewage Treatment Plan (STP)
- Sewage goes through different processes



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- Screen: Filters out metallic objects
- Grit chamber: Solid particles settle down
- 1° sedimentation Tank: Sewage stays for 6-8 hrs

  ↓ coliform by 30-40%
- 2° Treatment
  - Can use → Trickling filters (air treats sewage while passing through these filters)
    → Activated sludge process

- Activated sludge process
- In 1° Treatment: Sewage is aerated for 6-8 hours
- Sewage settled down in 2° sedimentation tank → Activated sludge
- The activated sludge is taken back into Aeration tank

- Activated sludge / Aeration sludge and Aeration Tank forms the heart of STP

Other methods

00:41:07

1. Oxidation ditch : 1 acre
2. Aerated lagoon: 2.5 acres
3. Oxidation pond: → 22 acres for 100,000 population
   → Require sunlight, bacteria and algae for its functioning
   → 3-5 ft deep
   → In rural areas
4. River / Sea fallout

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ENTOMOLOGY

(i) Anopheles Mosquito

00:01:14

- Disease : Malaria
- Source : Clean stagnant water
- Egg : single, boat shaped, lateral floats +.
- Larva : present on surface, no siphon tube
- Time of bite : Dawn to Dusk
- Sitting posture : Landing / inclined posture
- Flight range : 2-3 Kms
- Identifying feature : spots on wings.
- Also known as : Sophisticated mosquito
- Head and body of anopheles is in straight line

(ii) Aedes Mosquito

00:06:16

- Disease : Dengue, chikungunya, Yellow fever
- Source : Artificial storage cans
- Egg : Single / Cluster
  : Elongated cigar shaped
- Larva : Deep feeder, Siphon tube present

Adult mosquito

- Time of bite : day. 2 hours after sunrise and 2 hours before sunset
  : Endophilic
- Sitting posture : parallel to surface
- Flight range : 100-200 mts.
- Identifying feature : Stripes on body
- Also known as : Tiger mosquito.

(iii) Culex mosquito

00:11:15

- Disease : Japanese encephalitis > filariasis .
- Source : dirty, polluted, long standing water
- Egg : Clusters, rafts (eggs being tightly packed)
- Larva : deep feeder, siphon tube present

Adult Mosquito :-

- Time of bite : mid night
- Sitting posture : Hunch-back position
- Flight range : 11 - 13 Kms

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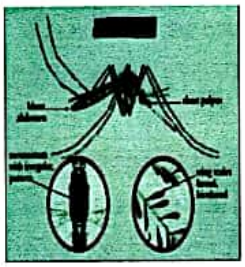
- Identifying feature : Big wings, buzzing sound
- Also known as Nuisance mosquito

(iv) Mansonia Mosquito

00:15:16



- Disease : Filariasis
- Source : Large water body with aquatic vegetation (pistia, water hyacinth)
- Eggs : arranged in clusters (star shape)
- Larva : attached to roots of aquatic plants,
  : Siphon tube present

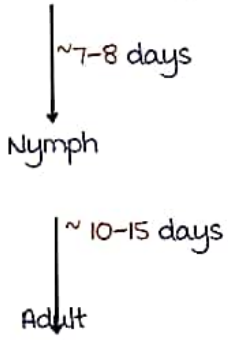
Adult mosquito :-

- Time of bite : Morning and evening
- Sitting posture : Squatting
- Flight range : 2-3 Kms
- Identifying feature : long legs

Louse Borne Disease

00:18:32

- Elongated
- Wingless, ectoparasites
- Claw- like legs
- Types of louse : Head, body, public louse
  : Public - most sturdy, heavy looking
- Life span : 20 - 30 days in the presence of blood meal.
- Life cycle : Adult lays 6-9 eggs / day



Louse borne disease :

- Relapsing fever : Borrellia recurrentis
- Epidemic typhus : Rickettsia prowazekii
- Trench fever : Rickettsia quintana
- Dermatitis

Preventive measures

- In Epidemics : Dichloro - Diphenyl Trichloroethane (DDT), BHC (Benzene Hexachloride), malathion
  : Malathion - most effective
- Carbaryl
- Permethrin

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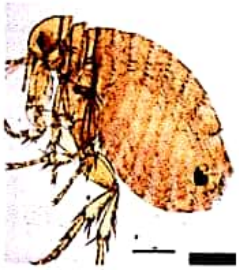
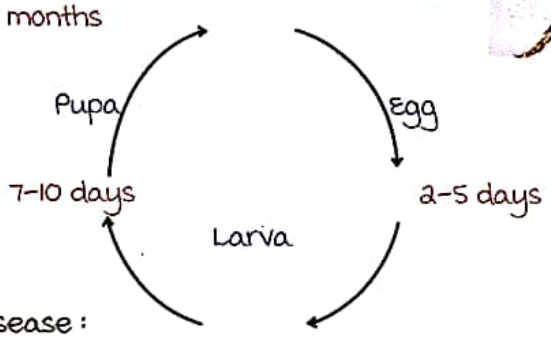
Flea - Borne Disease

00:22:27

- B/L compressed body
- Wingless
- Life cycle : 2 weeks to months





Flea borne disease :

- Plague
- Endemic (marine) typhus
- Chiggerosis

Flea indices in plague :

Death of rat is an early warning sign

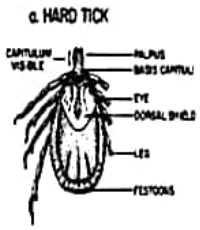
- General flea index
- Specific flea index (Cheopis index) - most sensitive
- Percentage incidence of flea.

Prevention and control : DDT, BHC

Tick Borne Disease

00:25:47

- 4 - legged
- Hard tick : Visible capitulum
- soft tick : no visible capitulum



Tick borne disease :

(i) Hard tick :

- Tick paralysis
- Tick typhus
- Tularaemia
- Viral hemorrhagic fever
- Viral encephalitis
- Viral fever
- Babesiosis

(ii) Soft tick :

- Q fever
- Relapsing fever
- Kyasanur forest disease (KFD)

KFD - can be caused by both hard and soft tick

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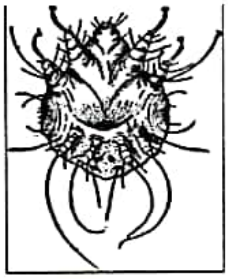
Mite Borne Disease

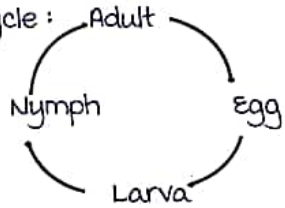
00:28:50



- Thick anterior limbs, thin posterior limbs
- In the figure of 8 / Tortoise shaped
- Spider like arthropods
- Peculiarity : Larval stage (Biting)
  ↓
  Adult stage (No biting)
- Infective form : Larva
- Life cycle : Eg : Rickettsia tsutsugamushi – (Infected rodent)
  Larva bites infected rodent and gets infected
  ↓
  Infected Nymph
  ↓
  Infected Adult → Infected Egg → infected larvae
- Transmission : Transstadial / Transovarian transmission.
- Trombiculid mite shows transstadial mode of transmission.

Sarcoptes scabiei

- Small tortoise shaped
- Life cycle :



  - Egg to adult takes 10 to 14 days
  - Adult lives for 20 – 30 days
- Transmission : Slow in cold areas, fast in warm areas.
- Spread : interdigital spaces (warm)
  : Forms Burrows (ovigerous tunnels) in interdigital Space
- Intense itching : due to formation of tunnels by sarcoptes scabiei and irritant fluid
- Itching is more in night due to vasodilation

Control measures for scabies :

- Benzyl benzoate 25% (HCH) → most effective
- Permethrin
- Crotamiton
- Telmosol

} ointment

Sand fly

00:36:41

- Size : 1.5 – 2.5 mm
- Head, thorax, Abdomen, wings
- Salient feature : hairy

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- Hopping range : 40 – 50 mts (Long legs)
- Predominantly exophillic
- Bite : nocturnal, painful, mostly bites lower limbs.

Sand fly borne disease :-

- Phlebotomus argentipes : Kala-azar, visceral leishmaniasis
- Phlebotomus papatasi : oriental sore, sand fly fever (Not found in India)
- Phlebotomus sergenti : oriental sore

Control measures

- Insecticide of choice : DDT @ 1-2 gm/m^2
- BHC (Benzene hexachloride)
- Lindane

Insecticides and rodenticides 00:41:50

(i) Mosquito control measures

a. Source reduction – elimination / disinfection of breeding placer
b. Anti larval methods : Physical method
: Chemical method
: Biological method
c. Anti Adult
d. Personal protection

Physical method :

- Mosquito larvicidal oil – most effective for Anopheles(no siphon tube)
(MLO) – Drawback : may kill fishes
– 40 – 90 litres/ hectare

Chemical methods :

- Mineral oils : MLO
- Paris green : has copper acetoacetate
: Emerald green coloured
: Rate – 1 Kg/ hectare
: Stomach poison to larvae
- Abate : also known as temephosphate
: most commonly used larvicide
: Rate – 1 ppm in wells, 50-100 g / Hectare
: contact poison to larvae
- Fenthion : Colourless liquid
: Garlic odour
: Stomach poison

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: Rate – 100 mg / sq. ft

- Malathion : Alternative of DDT
  : Yellow / brown colour
  : Unpleasant smell
  : 100 – 200 mg / sq.ft But effective only for 3 months

- DDT : Biomagnification
  : White amorphous liquid
  : Insoluble in water but soluble in solvents
  : Active component – Para para isomer
  : Contact poison
  : Rate :- 100 – 200 mg / sq. ft
  : Effective for 6months ⇒ long residual effect

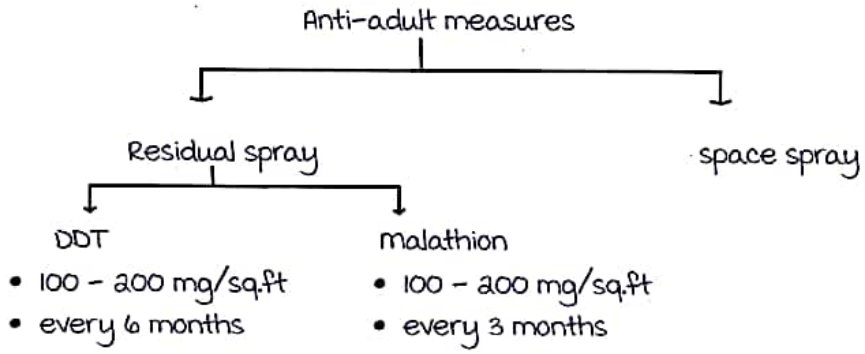
- BHC : Also known as hexachlorohexane (HCH)
  : White chocolate colour powder
  : Musty smell, irritant to eyes and nose
  : active component – γ(gamma) – isomer
  : Contact poison
  : Lindane – BHC containing 99% –Isomer
  – Also known as gammexane / γ– HCH.

Biological methods

00:53:56

- Fish : poecilia reticulata
  : Lebister
  : Gambusia
  } Larvivorous
- Bacillus thuringiensis : Larvicidal

Anti adult measures :



Space spray :
- Fogging agents
- Pyrethrum – Natural extract from chrysanthemum
  – Expensive
- Pyrethroids – synthetic derivative of pyrethrum
  – Highly effective

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- Eg : Deltamethrin, cyfluthrin, tetramethrin

Personal protection :
(i) Bed nets
(ii) Insecticide repellents ⇒ DEET (Diethyl -meta -toluamide) is more commonly used.

- Bed nets:
  - Ideal mesh hole : 1.2 mm × 1.2 mm
    : ~ 0.0467 sq .inch
    : 100 – 200 holes / sq. inch
  - Insecticide treated bed nets : used in areas with annual parasitic index (API) > 2
  - Long lasting insecticide treated bed nests : bed nets for > 6months
    : in API > 5

Rodenticides

00:59:41

(i) Zinc phosphide : commonly used
: White / brown liquid
: releases phosphine gas
: Toxic to humans
(ii) Barium carbonate : white powder, Commonly used
: Mixed with bait
(iii) Norbromide : vasoconstrictor, calcium channel blocker
: Selective rodenticide
: Toxic to humans
(iv) Red squill : Oldest rodenticide
: Plant derivative

Insecticide formulation

1:02:06

(i) Solution : used as a spray
(ii) Suspension : has residual effect
(iii) Emulsion : mixed with paint
(iv) dust : for anopheles
(v) Granules : Mansonia, Culex larvae

Insecticide toxicity :
(i) Organochlorous compounds :-
- Eg : DDT
- Nerve poison : convulsion, tremor, neurological disturbances
- DDT : least toxic
  HCH : 2 times more toxic than DDT

Scanned with CamScanner

Dieldrin : 5-8 times more toxic than DDT

- Antidote : Barbiturates.

(ii) Organophosphorus compounds :-

- Mechanism of action : inhibits cholinesterase ⇒ accumulation of Acetylcholine .
- Toxicity : ↑ salivation, uncontrolled micturition, respiratory paralysis
- Antidotes : Atropine, 2PAM (Pralidoxime) Iodine / Chloride.

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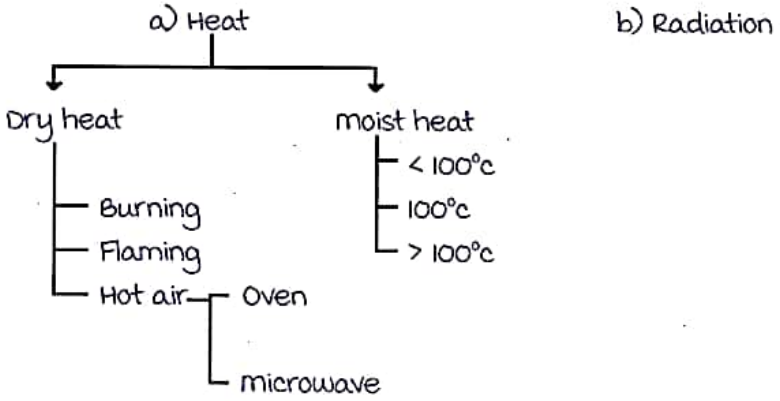
DISINFECTION

Types of disinfection

00:00:47

- Natural disinfection :
  - Air
  - Sunlight
- Physical Disinfection :



- Burning : - Used for final disposal of waste
  - Used for soiled waste , bandages , swabs
- Flaming : Used for - Wires , loops , sharps
- Hot air : i) Oven - Glass , oil , Vaseline , powder
  - 160°c - 180°c
  - Contact time : 1 hour

  ii) Microwave - Dental instruments , lab , media , gas , Lab instruments
- Moist heat air :

  i) < 100°c - Pasteurization , vaccine , Sterilization
  - → Holder method (66°c)
  - → HTST (72°c) High Temperature Short Time

  ii) 100°c - Surgical instruments , glass , utensils , linens , gloves .
  Contact time - minimum 20 mins

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Leave Feedback

iii) > 100°C – Pasteurization, linens – OT garments.

↓

K / a Autoclave → 120°c – 130°c for 20 –30 mins

- Not to be used for plastic

- Radiation :
  - Expensive procedure
  - Done at manufacturing plant – for large scale sterilization
  - Done for bandages, dripsets, plastic syringes, suturing materials.

Chemical disinfection

00:08:49

a) Solid	b) Liquids	c) Gaseous
• Limes	• Coal tar	
• Bleaching powder	• Quaternary ammonium compounds	
• Potassium permanganate	• Halogens	
• Halazone	• Other	

Solids :

1) Lime :
   - Cheapest Disinfectant
   - Odorizer as well
   - Disinfectant of choice for surface, floors

2) Bleaching power : $CaOCl_2$
   - Used to disinfect water
   - 2.5 gm – disinfects 1000 litres of water
   - Used in – paper, textile industry, water disinfection in urban and rural areas, excreta disinfection

3) Potassium Permanganate ($KMNo_4$) :
   - Good oxidising agent
   - Low disinfectant quality
   - Used for disinfection of : fruits and vegetables, Swimming pool, Eczema treatment.

4) Halazone : Solid chlorine tablets.
   - 1 tablet = 4 mg of halazone → disinfect 1 litre of water with contact time of 30 – 60 min.

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Liquid disinfectants

00:13:01

- Coal Tar : a) Phenol – Not a good disinfectant .

  b) Crude phenol – Mc used at household
  At 5 – 10% strength used for disinfection of feces / floor

  c) Cresol – Brown liquid (Pure)
  - Turns white on contact with water
  - Lysol : Saponified cresol , used for linen
  - Cyllin : for drains and latrines
  - Lzal : has specific activity against Salmonella (Used during Typhoid outbreak)

  d) Chlorxylenol : Dettol. Used for surface / floor disinfectant .
  All purpose disinfectant

  e) Chlorhexidine : Used in mouth wash , burn Ointments .

- Quaternary ammonium compounds :

  a) Cetremide / Cetavalon – Soapy feeling ,
  used for contaminated wound wash .

  b) Savlon – Cetavalon + chlorhexidine
  – Soapy disinfectant , Used to disinfect clinical Thermometers / Instruments

  c) Zephiran – for mucosal cavities , dental procedures .

- Halogens : a) Iodine – Broad spectrum germicidal Agent .
  – Disinfectant of choice used in pre – operative care , skin disinfection
  – Used in Mendel's paint

  b) Chlorine – Used as water disinfectant

- Other Disinfectants :

  a) Hydrogen peroxide : Powerful oxidising Agent
  – Weak disinfectant
  – Used in cleaning of suppurative wounds .

  b) Alcohol : Disinfectant at 60 – 80% concentration

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c) Formalin : Used for delicate articles , organ preservation , Tissue Preservation

- Gaseous Disinfectants : Formaldehyde
  - Obtained by boiling liquid Formalin .
  - Uses : - Disinfection of isolation room / wards , OT rooms
  - Material disinfection - Books , library , garment stores

Standardization of Disinfection 00:23:10

- Reidel walker coefficient (RWC)
  - Also known as carbolic coefficient
  - Tells us when compared to phenol the standard action of various disinfectant .
- Chick martin coefficient
  - Improvised RWC
  - Germicidal activity is compared in presence of yeast / fungi

Disinfection procedures 00:25:08

- Feus disinfection : 10% bleeching power (disinfection of choice) (or) 10% formalin (or) 10% crude phenol (or) 5% cresol
  - In case - No disinfectants are available -
    Add 1 part of lime to 4 part of water , let it sit for 1 - 2 hour
    (Or)
    Add boiling water and let it sit until its cool
- Bed pans / stool containers :
  - Best : Steam disinfection + 2.5% cresol for 1 hour
  - Other : Burning of spirit cotton inside (for emergency)
- Sputum : patient level - burning
  at hospital = 5% cresol for 1 hour
- OT Room
  - Best - Formaldehyde fumigation for 4 hours
  - Other : 2.5% cresol for floors
- Linen , hospital clothes - Cresol - 2.5% , phenol - 5% , Formaldehyde - 10%
- Books & library - Formaldehyde

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- Jewellery , utensils , crockery – Formalin at 10 % for 20 – 30 min
- Needles / sharps – Autoclave – 160°c moist air under pressure for 30 – 60 min

High level disinfection 00:31:38

- Done by keeping the instruments 30 mins in boiling water
- Done for – laryngoscope , Proctoscope , Vaginal speculum

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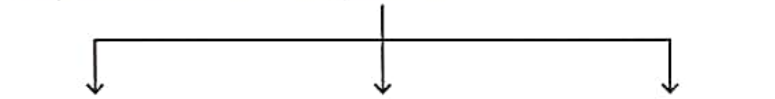
HOSPITAL WASTE MANAGEMENT

Introduction 00:00:34

- Hospital wastes are composed of:



Biomedical waste	General waste	other waste
- Yellow	- Dry	- Electronic
- Red	- Wet	- Radioactive
- White	- Construction	- Battery
- Blue		

Biomedical waste 00:01:57

- The management of these wastes comes under the Ministry of Forests and Environment
- Based on Biomedical waste Management Rules (2016), the waste is categorised into:

→ Yellow
- Anything infectious (animal, anatomical, microbiological)
- May or may not undergo pre-treatment
- Incineration

→ Red
- Rubber tube, plastic tube
- Do not need pre- treatment
- Recycled

→ Blue
- Glass, ortho implants
- May or may not be disinfected
- Recycled

→ White
- Sharps and metals
- Shredded
- Recycled

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Yellow category

00:05:28

- Has 8 Sub Categories (a-h)
- Process: Segregation of wastes
  ↓
  +/- Pre-treatment
  ↓
  Common Biomedical Waste Treatment Facility (CBWTF)

- Yellow (a): Human Anatomical Waste

Contains	Segregation	Pre- Tt	CBWTF	No CBWTF
Items contaminated with Human tissues, organs, body parts and fetus below the viability period. This includes, placenta and extracted tooth	Yellow non chlorinated plastic bag Store in yellow container	Nil	Incin-eration	Soiled waste should be disposed through Plasma Pyrolysis unit or in twin chambered compact incinerator with a seconds retention time in secondary combustion chamber Deep burial*

- Yellow (b): animal anatomical waste

	Segregation	Pre-Tt	CBWTF	No CBWTF
Animal carcasses, body parts, organs, tissues, including the waste generated from animals used in experiments or testing in veterinary hospitals or colleges or animal houses	Yellow non chlorinated plastic bag Store in yellow container	Not re-quired	Incin-eration	Soiled waste should be disposed through Plasma Pyrolysis unit or in twin chambered compact incinerator with a seconds retention time in secondary combustion chamber Deep burial*

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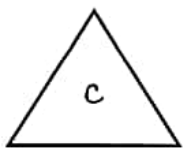
- Yellow (c): soiled waste

	Seg regation	Pre-Tt	CBWTF	No CBWTF
Items contaminated with blood/body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components. This includes used infectious material such as caps, shoe-cover, blotting paper/gauze, wooden swab stick, paraffin blocks, indicators tapes and disposable (single use non-linen based) masks and gowns.	Yellow non chlorinated plastic bag Store in yellow container	Not re-quired	Incin-eration	Soiled waste should be disposed through Plasma Pyroly-sis unit or in twin chambered compact incinerator with a seconds retention time in secondary combustion chamber

- Yellow (d): Expired and Discarded Medicine

	Segregation	Pre-Tt	CBWTF	No CBWTF
Expired and Discarded Medicine	SEPARATE Yellow non chlorinated plastic bag Store in yellow container	No treatment required	Return back to pharma company or incineration >1200 deg C	Sent back to manu-facturer / or common BMW incinerator
Cytotoxic drugs	separate yellow coloured non chlorinated plastic bag labelled as cytotoxic hazard	No treatment required		sent back to manu-facturer / or common BMW incinerator

- Cytotoxic drugs are labelled with 'C':



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- Yellow (e): chemical waste (solid/ liquid)

	Segregation	Pre-Tt	CBWTF	No CBWTF
chemicals used in production of biological, discarded containers of chemicals and disinfectants etc. This includes solid or liquid residual chemicals used in HCFs.	chemical waste in yellow coloured containers or non-chlorinated yellow plastic bag	No treatment is required to be carried out at the facility	Incineration	Incinerator or nearest Common BMW treatment centre

- Its either incinerated or returned to the manufacturer or pharma company

- Yellow (f): Chemical waste (liquid)

	Segregation	Pre-Tt	
Silver X ray film liquid	Separate collection	Sent to registered recycling unit for silver recovery	
Liquid chemicals from lab, floor washings, cleaning, house-keeping and disinfecting activities, etc	Separate collection	Neutralize with soda ash or sodium bicarbonate OR Neutralize with citric acid or ascorbic acid	Effluent treatment plant
infected secretions aspirated body fluids	Yellow category	Pretreat with chemical treatment	

- Infected serum, body fluids should be pre-treated
- For chemical disinfection: Sodium glutaraldehyde

Scanned with CamScanner

- Yellow (g): Discarded linen, mattresses, beddings contaminated with blood, body fluids, routine mask and gown

		Segrega-tion	Pre-Tt	CBWTF	No CBWTF
Discarded Linen. mattresses, beddings contaminated with Blood, body fluids, routine mask and gown	discarded linen from bed-sheets, beddings. re-usable routine masks and gowns.	Yelow non chlori-nated plas-tic bag Store in yellow contaier	Cut and Disin-fect	incin-eration	Cut into pieces, disinfect with non chlorinat-ed chemicals and incinera-ated

- Disinfectants of choice are non-chlorinated:
  - → 5% phenol } m/c used
  - → 5% cresol }
  - → 2-3% formaldehyde
  - → 2% formalin

- Yellow (h): microbiology, biotechnology and other clinical laboratory waste

	Segre-gation	Pre-Tt	CBWTF	No CBWTF
microbiology, Bio-technology and other clinical laboratory waste, waste blood bags (containing date expired or contaminated blood), Laboratory cultures, stocks or specimen of micro-organisms, live or attenuat-ed vaccines, human cell cultures used in research, industrial laboratories, produc-tion of biological, residual toxins, dishes and devices used for cultures.	Yellow non chlori-nated plastic bag Store in yellow con-tainer	auto-clave / microw ave / Hydro-clave BEFORE hand-ing to CBWTF	incin-eration	Soiled waste should be disposed through Plasma Pyrolysis unit or in twin chambered compact incinerator with 2 seconds reten-tion time in secondary combustion chamber Deep burial*

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Red category

00:24:13

- Rubber and plastic tubes (Ryle's tube, Nasogastric tube etc...)
- Includes:
  - Foley's catheter
  - Urobag
  - Disposable syringes
  - IV sets
  - Gloves
  - Vacutainers
- Vials / vacutainers containing blood belongs to yellow (h)
- Process: waste is put in red bin

(plastic bag > 50-micron thickness)

↓ No pre-treatment required

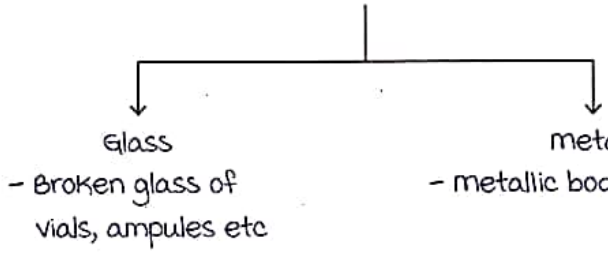
CBWTF (Autoclave / microwave / Hydroclave)

↓

Shredded / returned to manufacturer

Blue category

00:28:21



- Process: waste is put in a puncture proof blue → Plastic bin / Cardboard box

↓ No pre-treatment required

CBWTF

↓

Autoclaved

↓

Recycled / sent back to manufacturer

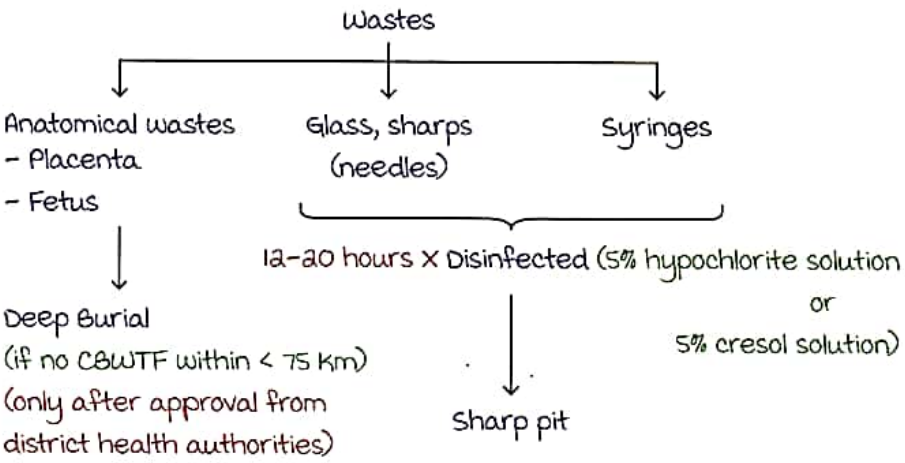
Scanned with CamScanner

White category 00:30:06

- Sharps / metals:
- Surgical blades
- Needles
- Suture needles, lumbar puncture needles
- Remains from needle destroyer

- Process: Waste is put in a puncture proof white translucent plastic bin
↓ No pre-treatment required
CBWTF
↓
Autoclave
↓
Shredding / sent back to manufacturer

Areas without access to CBWTF 00:37:13



- Deep burial
- If there is no CBWTF within < 75 Km
- Allowed only if the ground water table < 6-7 meters
- > 2 meters deep
- 10 cm soil is added

- Sharp pit
- Concrete pit
- 1m X 1m X 1m deep

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Leave Feedback

- Biomedical waste handlers
- Mandatory immunisation (against Hbs Ag)
  - HBV
  - TT
- Should have personal protective equipment
  - Apron
  - Mask
  - Goggles / Face shield
  - Cap
  - Gumboots
  - Heavy duty rubber gloves

Spill management

00:44:14

- Blood spills
  1. Personal protection equipment
  2. Blotting paper or absorbing paper
     ↓
     Disinfectant x 20 minutes
     ↓
     Blotting paper / absorbing paper
  3. Discard → Yellow (h)

- Mercury spills
  1. Personal Protection Equipment (PPE)
  2. Collect (using cardboard pieces / x-ray films / duct tape / syringe
     ↓
  3. Bottle (1/2 filled with water)
     ↓
  4. Cover spill area with 10% sodium thiosulphate
     ↓
  5. Clean / Mop up
  6. Remove PPE → Separate Bag → Yellow category

Incinerator

- ↑ temperature > 1000°C
- Advantages:
  - ↓ waste volume to < 80-95%
  - ↓ waste weight to < 30%

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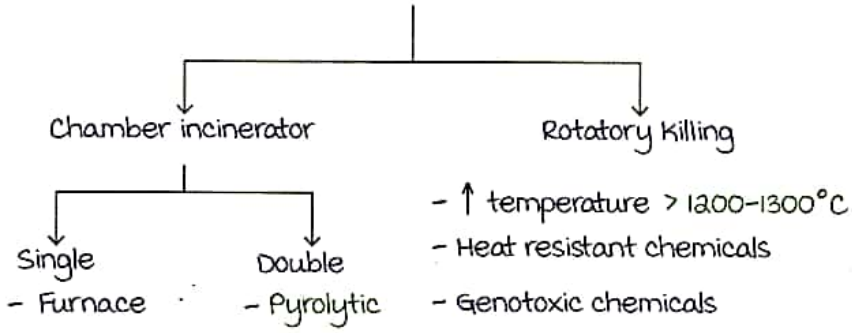
- Disadvantages:
  - Not suitable for:
    - → Pressurised gas containers
    - → Reactive, hazardous chemicals
    - → Ag, Cd containing, Hg, Sharps

- Types:



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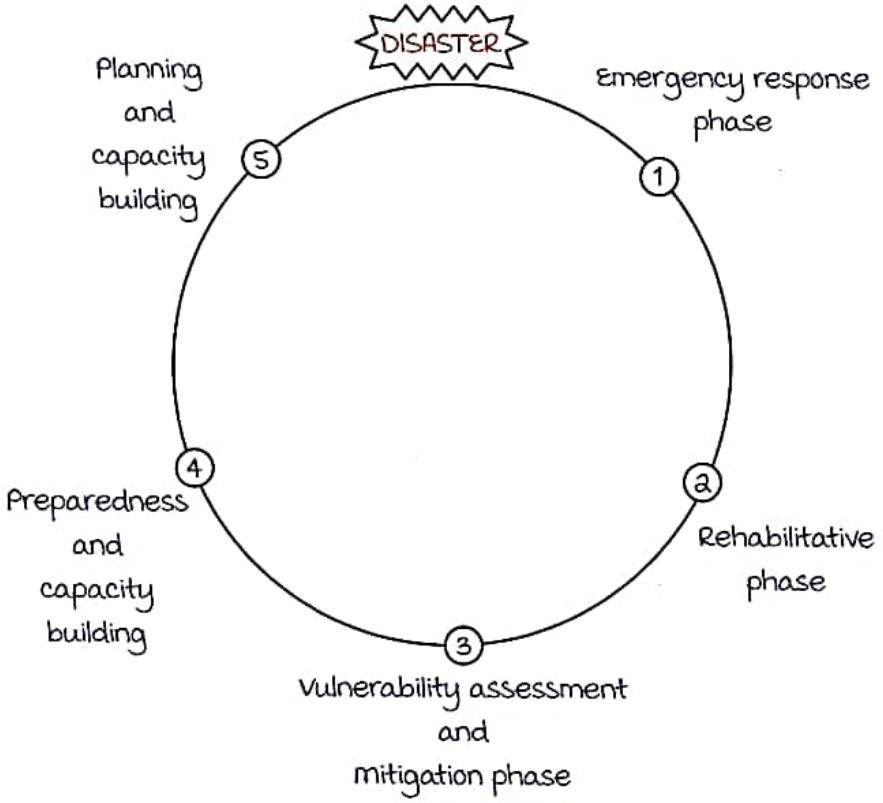
DISASTER MANAGEMENT

- National disaster awareness day – 2nd Wednesday of October
- International disaster risk reduction day – 13th October
- Disaster: Occurrence of an unwanted event, which causes damage, ecological disruption, economic and loss of life or health and requires outside help / assistance / response
- Hazard: A potential to cause damage or disruption of life or property
- Disaster risk (DR) = Hazard x Vulnerability

Disaster cycle

00:02:00



Emergency respone

00:05:20

(i) Primary phase (ii) Secondary phase (iii) Tertiary phase

(i) Primary phase (0-6 hrs): First aid, triage, treatment

(a) Triage – 1 "Prioritization" (Based on colour tag)

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Red : Immediate medical attention
Yellow : medical attention
Green : Can wait for healthcare facility
Black : Dead person

(b) Reverse triage: used in surge (bed scarcity), wars etc

Green → Yellow → Red

(ii) Secondary phase (6-24 hrs)

- Prevention of communicable disease by improving sanitation
- ↓ Death toll

Tertiary phase 00:10:30

- > 24 hrs, "Help and Aid"
- By providing food, shelter and blanket
- Chlorination: 0.7 to 0.9 ppm
- Chlorine tablet: 2.5 gm for 225 litres of water
- Safe water supply – tap water: 200 to 250 population @ 15 litres / person / day
- Vector control
- Sanitation
- Shelter
- Measles vaccination campaign : Since measles outbreak and acute gastro-enteritis are more common in case of flood, earthquake etc
- Vaccines for health-care professionals: Hepatitis B and TT vaccines

During a disaster:

- MC disease: Acute G.E
- MC outbreak: Measles
- MC vitamin deficiency: Vitamin A, PEM

- Shelter:

- Area > 300 sq.ft
- Area required – > 40 sq.ft / person

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- 1 water point for > 250 people within 150 meters of living area
- 1 Latrine for 20 people within 30 meters
- Minimum distance between water and latrine > 100 meters

Disaster mitigation and prepardness 00:19:10

(ii) Disaster mitigation

Measures to reduce the impact by administrative and legislative interventions before a disaster occurs. Like –

- Proper land use
- Building codes
- Conducting regular health check up
- Fire safety norms

(ii) Disaster preparedness

- Being prepared to face a disaster
- Measures taken to prepare, gather resources, build capacity to face a disaster and effectively cope with consequences

Categorization of disaster 00:23:00

(i) Levels of disaster:

- 4 levels – L_0 – No disaster
  L_1 – Manageable disaster: district level
  L_2 – Manageable disaster: state level
  L_3 – Manageable disaster: national level (NDRF)

(ii) Earthquake seismic zone:

Modified mercalli scale – mm scale

- 5 zones – Zone I and II : < VI mm scale
  - Zone III : mm VII
  - Zone IV : mm VIII
  - Zone V : > mm IX
- Zone IV: Seen in Delhi, Himachal, SikKim, Haryana, Chandigarh
- Zone V: Seen in Bihar, Himachal, North eastern states, Andaman and Nicobar

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Disaster management in india 00:25:22

- Disaster management in India is under Ministry of home affairs (MOHA)
- Disaster management
  - Biological disaster : MOHA + MOHFW
  - Landslide : MOHA + ministry of mines
  - Floods : MOHA + ministry of water resources
  - Tsunami / cyclone : MOHA + ministry of earth science
- NDRF – National Disaster Response Force

UN disaster risk reduction programe 00:27:36

Sendai framework

(i) Understand disaster risk

(ii) To improve disaster risk governance

(iii) To invest in disaster risk reduction

(iv) Enhance disaster preparedness

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OCCUPATIONAL HEALTH

Occupational health institutes in India

Institutes	Location
National Institute of Occupational Health	Ahmedabad
Central Labor Institute	Mumbai
Regional Labor Institutes	Kanpur, Kolkata and Chennai
Central Mining and Research Station, CSIR	Dhanbad
Industrial Toxicology Research Centre	Lucknow
National Environmental Engineering Research Institute	Nagpur

Thermal injuries

00:01:48

1. Heat stroke :
   - Failure of heat regulation
   - Dry , hot skin
   - No sweating
   - Body temperature > 110°F
   - Treatment : Rapid cooling

2. Heat hyperpyrexia :
   - Milder heat stroke
   - Impaired heat regulation
   - Body temperature > 105 – 106°F
   - Dry / hot skin

3. Heat exhaustion :
   - Impaired salt – water balance in the body
   - Body temperature < 102°F

4. Heat cramps :
   - Due to decreased salt (NaCl) in the body
   - Over exertion → Increased sweating → loss of salt from the body

5. Heat syncope :
   - Due to vasodilation , pooling of blood in lower limbs and impaired cardiac filling
   - Brief , transient fainting episode
   - Self recovery occurs

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Heat stress index :

Measure for heat storage capacity

0 – 10 : no heat stress

> 10 : Heat stress

100 : Maximum tolerable level

Cold injury

00:07:24

1. Trench foot : Wet type of cold injury
   - Immersion of feet in cold water / ice / snow
   - Acute vasoconstriction followed by vasodilation leading to transudation and hemoconcentration

2. Frost bite :
   - Freezing of tissues → Formation of ice crystals
   - Treatment : Rewarm the area to 42°c for 20 – 30 minutes

Pneumoconiosis

00:09:53

- Dust particles → can lead to restrictive lung disease → eventually causing type I respiratory failure

- Size of dust particles :

  > 10 micron : Filtered by the nose

  5 – 10 micron : remains in upper respiratory tract

  3 – 5 micron : enters lower respiratory tract

  1 – 3 micron : enters alveoli

  < 1 micron : shows brownian movement

Silicosis	Silica	Sand stone industry, granite industry, pottery and ceramic industry, gold, mica and steel industry
Asbestosis	Asbestos	Asbestos cement factory, fireproof textiles
Siderosis	Iron	Iron ores and mines, iron and steel industry
Anthracosis	Coal dust	Coal mines
Aluminosis	Aluminium	Aluminium industries
Baritosis	Barium	Photography, printing, barium diagnostic works
Lithosis	Stone	Stone industries
Byssinosis	Cotton dust	Textile industries
Bagassosis	Sugar cane dust (Bagasse)	Cane sugar factories, paper and card- board factories
Tobaccosis	Tobacco dust	Tobacco factories (Beedi, Cigar and Cigarette)
Farmers lung	Mouldy hay (Grain dust)	Agricultural industry

Silicosis and Asbestosis

00:17:50

- Due to silica dust
- Seen in regions of increased ventilation i.e, upper zone of lungs (upper 2/3rd)

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- Silica dust in alveoli causes alveolitis
- Alveolitis → Exudation of proteins → confluence of inflamed alveoli → appear as nodules → Nodules fibrosis
- X - ray : Snow storm appearance

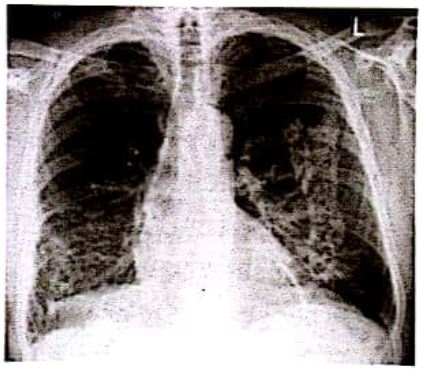
Asbestosis :

- Due to asbestos fibres

↓

Affect lower zone of lung

- Asbestos fibres can persist in the airway and cause peribronchial inflammation → leads to diffuse inflammatory reaction
- X- ray : Ground glass appearance



Silicosis	Asbestosis
• Silica dust • Alveolitis • Nodular fibrosis • Affects upper 2/3rd of lung • X - ray : Snow storm appearance • High association with tuberculosis Silico -TB : Sputum negative , x - ray findings inconsistent	• Asbestos fibre • Peribronchial inflammation • Diffuse inflammation / diffuse fibrosis • Affects lower 2/3rd of lung • X - ray : Ground - glass appearance • Increased risk of bronchial carcinoma and mesothelioma of pleura

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Anthracosis
- Coal workers disease
- Cause black lung

Bagassosis :
- due to Thermoactinomyces sacchari associated with sugarcane dust
- causes mottling of lung

Byssinosis :
- Was called mill fever / monday morning fever
- Due to cotton dust → around 2 microns in size
- Causes increased thickness of interalveolar septa
- Presents with intense irritant dry cough

Farmer's lung
- Seen in agriculturists
- Dve to fungus on mouldy hay : micropolyspora faenii

Prevention of pneumoconiosis 00:33:12

- Pneumoconiosis is not reversible
- All Pneumoconiosis are notifiable diseases
- Better protection to be ensured
- In foundry / factory workers , blow of air from sides ensures less inhalation of dust
- Types of asbestos fibres :
  a) Serpentine – Safer variety than amphibole
     – Chrysolite type is safest type
  b) Amphibole – irritant
     – more dangerous than serpentine

Occupational cancers 00:37:38

1. Skin cancer
   - most common occupational cancer
   - Carcinogens : Anthracene , coal tar , soot , oils and dyes / UV rays x – rays
   - most common type of skin cancer : squamous cell cancer

2. Lung cancer
   - Carcinogens : arsenic , beryllium , isopropyl oil , chromium , cobalt tobacco , coal tar , nickel [Heavy metal industries]
   - most common type : peripheral lung carcinoma
     squamous cell carcinoma

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- Strong association with smoking

3. Bladder carcinoma :
   - Strongly associated with smoking
   - Carcinogens : beta - naphthalene , benzidine , aniline dyes

4. Leukemia :
   - Carcinogens : Benzene , ionizing radiations , radioactive isotopes

Benzene, Ethylene Oxide	Leukaemia
Beryllium, Cadmium, Chromium, Radon, Silica, Ionizing radiation, PAH, Nickel	Lung
Asbestos	Mesothelioma
Arsenic	Skin, Lung, Liver cancer
Benzidine	Bladder
PAH	Skin, Scrotum and Lung
Vinyl Chloride	Liver
Wood dust, Nickel, Chromium	Nasal Sinus

Caplan syndrome

- rheumatoid arthritis with pneumoconiosis
- Intrapulmonary nodules seen
- seen in mine workers

Plumbism

00:42:41

- Lead toxicity
- m.c route : Inhalation
  m.c industry : Paint > Batteries > Automobile

- Lead inhibits ALA dehydratase and Ferrochelatase
  ∴ Increased coproporphyrin or ALA levels in urine
  (Highly sensitive screening test)

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- Clinical features :
  1. Earliest feature : Anemia
     facial pallor is earliest sign
  2. Abdominal colic or painter colic
  3. Neuropathy : Wrist / Foot drop
  4. Encephalopathy
  5. mental deterioration
  6. Burtonian line : Bluish line on gums

Diagnosis :
- Screening test : urine ALA level (best screening test)
  urine coproporphyrin
- Diagnostic test : blood lead levels

	Normal	Dangerous level
Urine ALA levels	6 mg / L	60 mg / L
Blood lead levels	< 10 mcg / 100 ml	> 40 mcg / dl

* Treatment for lead toxicity started at blood lead level > 70 mcg/dl

- Treatment
  - Succimer : oral chelating agent
  - Dimercaprol : Parenteral chelating agent
    : may be used with calcium disodium EDTA

Decompression sickness 00:50:40

- Seen in deep sea divers due to rapid ascent
- As depth increases , pressure and solubility of gases to from bubbles leading to decompression sickness
- Also called Bend's disease
- Types :
  type I : mild disease
  : Swelling of body
  : Joint pain
  Type II : Neurological symptoms
  Cardiovascular symptoms
  pulmonary edema

Treatment :
100 % hyperbaric O_2

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Acute mountain sickness

00:54:54

- At > 2500 meters above sea level, partial pressure of O_2 is low
  → cause alkalosis
- Mild features : Head ache, nausea / vomiting
- Serious acute mountain sickness :
  a) High altitude pulmonary edema (HAPE)
  Vasoconstriction in pulmonary circulation
  ↓
  ventilation perfusion mismatch
  ↓
  Hypoxia
  ↓
  Alkalosis

  b) High Altitude cerebral Edema
  Hypoxia → cause vasodilation in brain → edema

Treatment : Acclimatization
Ascent should not be faster than 300 m/min

Prevention of occupational Diseases

00:58:11

- Enforce legal actions
- Healthy environment
- Ergonomics : suiting the job to the worker
- Sickness absenteeism :

$$= \frac{\text{Number of worker absent days}}{\text{Total working days}} \times 100$$

[* Emporiatrics : study of travelers]

Pre - placement health examination

Industries	Pre employment screening
Lead	Anemia, Hypertension, Nephritis and Peptic ulcer
Dyes	Asthma, skin, bladder and kidney diseases and Precancerous lesions
Solvents	Liver and Kidney disease, Dermatitis and Alcoholism
Silica	Pulmonary TB (Healed or active), Chronic lung disease
Radium and X-rays	Blood disorder
Food handlers	For communicable diseases, hepatitis, typhoid, contagious diseases

Radium and x-ray : Examination for pre-cancerous lesions to be done

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Perodic examination

- Done annually in all organisations
- monthly examination done in :
  - Lead , dye industries
  - Radium (radioactive) industry
  - Heavy metals (Arsenic , chromium , cadmium)
- Daily examination done for : Dichromates

Notifiable disease under Factory act

Silicosis
Asbestosis
Byssinosis
Anthracosis
Cancer and dermatitis (occupation related)
Noise induced hearing loss

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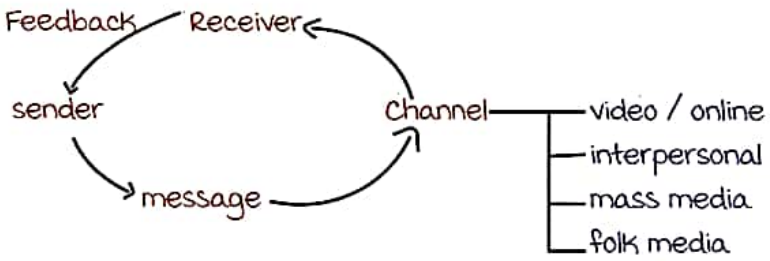
IEC

Communication process

00:01:07



Types of communication –

a) one way – didactic communication
   2 way – Socratic communication

b) Formal – Guide lined / structured way to talk
   Non formal – Gossip circle / Grape vine talk

c) verbal / visual / Audio – visual

Barriers of communication :

- Physiological – Hearing, Expressing, Representational problems
- Psychological – poor level of intelligence, emotional disturbance
- Environmental – Noise, poor visibility
- Cultural – beliefs, understanding, language, customs, concepts.

Functions of communication :

- Information – giving data / facts
  Education – to ↑ knowledge → change in attitude → Behavioural change
- Motivation – power to act from within
  Persuasion – Influence.

Education	Propaganda
– it is Knowledge	– Instilled Knowledge
– Actively acquired	– passively acquired
– Promote thinking	– halts thinking
– Disciplines the primitive thinking	– it promotes the primitive thinking– gives emotional charge
– Helps to judge before you act	– Spoon fed with passive Knowledge
– Self control & self motivation	– no behavioural change
– Behavioural change present	

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Motivation	Persuation
• Enlightenment → Usually short term	• Influence – short term • Conscious change in behaviour in a desired manner. • There is change in your feelings, attitude, belief → Brain wash

Approach to health education 00:16:48

- Regulatory Approach :
  - Legal action / government power used.

Eg : • Sterilization launched in 1976 → stopped
• Child marriage act
• Banned the sati system

- Service Approach
  - free services are provided.

Eg : • Toilets
• Immunization
• Mid day meal scheme

- Health education approach
  - Banners, posters etc.
  - Cause propaganda

Eg : • Start teaching early (in young age)
• Onus of health is on the individual himself
• Propaganda, mass media – cause slow behavioural change

- Primary health care approach –
  - Community involvement
  - Intersectoral co-ordination
  - Active involvement of population.

Eg : • Rashtriya Kishor Swasthya Karyakram → saathi approach.
• PHC / CHC → Rogi Kalyana Samiti, Mahila Arogya Samiti

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Modes of health education 00:23:12

- medical model : Information on treatment, Early diagnosis, Screening etc are given.

- motivation model : make people aware of information / facts. This may result in motivation & action; leading to internalization.

- Social intervention model : Most of the things we do are Authenticated / Approved / legitimated by others.
  Nothing will change till the group changes.

- Incentives :
  a) Intrinsic → Patient is benefited
  b) Extrinsic → • Financial – Janani Suraksha Yojana
  • Psychological – Awards
  • Material – TB poshana yojana

Methods of communication 00:30:23

- Individual Approach :
  Interpersonal contact, eg : Telephone, letter, visits, Interview

- Group Approach :
  4–6 members a group (Not >25)
  a) Group discussion (6–12) members
  b) Panel discussion – between experts, on a common topic.
  no structure / order → In front of audience.
  c) Symposia – lecture set in series in front of audience.
  d) Work shop – hands on training → to attain skills.
  Series of meeting, group size <25
  e) Seminars – 6–8 hours / day ; on a specific topic / theme.
  f) CME / Conference – ↑ Knowledge of attenders
  g) Role play – Best way of group discussion,
  Give a practical understanding + interaction.
  Socio-drama enactment → at the end of the role play it is open for discussion.

- Mass approach
  - TV, radio, news paper.
  - Online / social media
  - Direct mailing

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- Posters, museum exhibition, folk methods

Delphi : Type of group discussion to solve a complex problem.
outcome → perfect solution.

Cafeteria : used for family planning.
Client chooses the mode of contraception suitable for them

Type of interviewing 00:40:25

- Structured - predetermined
- Unstructured - Extempore
- Focused - used to study social & psychological effects of mass communication
  - It studies experience, attitude, emotional response to specific intervention
- Repetitive - to note gradual change in people over time.
  - Social, psychological or behavioural changes.

Art of interviewing :
Contact → Start interview → Building rapport(most crucial)→
Recall → Encourage → Guide → Recording (least done) →
Close interview → Report writing

GATHER - Greet Ask Tell Help Educate Review
↓
most crucial

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PRIMARY HEALTH CARE , MDG, SDG

Introduction 00:00:43

- The health care in India is divided into 3 section :

- Primary health care
  - 1st level of contact
  - Sub centre, primary health centres
  - Grass root level workers : ASHA
    USHA
    Anganwadi visitors
    Health visitors
    Trained dais.

- Secondary health care
  - Intermediate health care
  - Community health centre , district hospital, first referral units

- Tertiary health care
  - Specialised health care
  - medical colleges, specialised hospital.

Primary health care 00:03:21

- Basic health care
- Provides :
  - Health promotion
  - Disease prevention
  - Curative care
  - Rehabilitative care

  } Holistic health care

Elements of health care :

- Education
- Locally endemic diseases care
- Essential drugs
- MCH and family planning
- Expanded immunisation programme (Universal Immunisation Program / National Immunisation Schedule / Mission Indradhanush)
- Nutrition supply
- Treatment of common diseases
- Safe water and sanitation

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Principles of health care :

1. Equitable distribution
   - Priority given to the patients who requires the care most
2. Community participation
3. Intersectoral coordination
   - Eg: ICDS program → Ministry of Health and Family Welfare (MOHFW) + Ministry of Women and Child Development
     Poshan yojana → MOHFW + Ministry of Food
     Biomedical waste → Ministry of Health and Family Welfare + Ministry of Forest and Environment

4. Appropriate Technology
   - Eg : IT enabled system in TB
     Zn based ORS
     Jai Vigyan mission (Rheumatic fever)

RKS and Mahila Arogya Samiti 00:07:52

RKS
- Rogi Kalyan samiti
- Management of health care facility

Mahila Arogya samiti
- In urban areas
- Management of urban health centres
- Responsible for 50 - 100 houses (250 - 500 population)

IPHS 00:09:25

- Indian public health standards
- Standards for the government
- NABH (National Accredition Board for Hospitals)
- NABL (National Accredition Board for Laboratories)

		Staffs	KITS (A - P)
1. Subcentre	A	2	A, B, C
	B	3	
2. PHC	A	12 - 18	D
	B	14 - 21	
3. CHC		46 - 52	E - P

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Global health care 00:12:43

MDG (Millenium Development goals)
- Started in 2000 → 2015
- 8 goals

SDG (Sustainable Developmental Goals)
- 2015 → 2030
- 17 goals
- Goal no. 3 → Health and well being

- Goal no. 3
  - Targets

3.1	MMR < 70 / lac	2030
3.2	NNMR < 12 / 1000 U5MR < 25 / 1000	2030
3.3	End – TB, HIV Malaria / neglected tropical diseases Hepatitis, water borne diseases	2030
3.4	Reduce 1/3 premature mortality from NCD	2030
3.5	Substance abuse prevent	
3.6	½ reduce deaths from RTA	2020

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HEALTH CARE SYSTEM IN INDIA - NHM

National Health Mission (NHM) → 2014

It has 2 components :

a) NRHM (National Rural Health Mission) → 2005

b) NUHM (National Urban Health Mission) → 2011

NHM :

- Based on 4 principles :
  - Equity
  - Equality
  - Effectivity
  - Efficiency
- 5 approaches to this programs :
  - Communitize
  - management capacity
  - Flexible financing
  - HR management
  - Quality IPHS (Indian Public Health Standards)

- NHM is an umbrella program, all health programs of the country comes under this.

- The logo - has 1 daughter in a family.
  Stating - NRR = 1
  (Net Reproductive Rate)

Organisation of NHM

00:05:24

Digital Hospital (DH) - Administration

↓

Community Health Centre (CHC) → Plain Area (PA) = 1,20,000

↓ → Hilly/forest/tribal = 80,000 area (HFTA)

Primary Health centre (PHC) → PA : 30,000 / HFTA : 20,000

↓

Sub centre (sc) → PA : 5000 / HFTA : 3000

↓

ASHA - Workers → 1 ASHA is for 1000 population at village level.

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Staff at various setup :

- ASHA → Village level
- SC → MPW - male & female (multi purpose worker)
- PHC → medical officer in charge (MO),Ayush (Ayurveda, yoga, Unani, Siddha, Homoeopathy), ANM, Pharmacist, Health assistant .
- CHC → Specialists (General medicine, surgery, Gynecologist Pediatrician + Anaesthesiologist + Ophthalmologist + ANM + Pharmacist + OT technician + lab technician)
- District Hospital → All Clinical specialities + specialized labs + Program managers .

Asha Worker

00:11:40

- 25 -39 yr of age, at least 10th pass should be married
- Preferably a mother (Not > 2 children)

Function :

- Work for all NHP
- members of village Health sanitation and nutrition committee .
- Once a month " Nutrition Day " is celebrated & ASHA will coordinate it .
- Family planning : Home delivery of condoms .
- Responsible for the health care of the community .
- Drug depot holders in community (Drugs are kept in Anganwadi, ASHA worker is responsible for issuing the Drug)
- ASHA - Implementation of program at the lowest level .

Multi purpose worker

00:16:21

MPW work at Gram panchayat level

- Male MPW : Functions
  - NVBDCP - Implementation
  - Water Quality in the area
  - Take part in OPD everyday & conduct survey
  - Maintain record / Register in sub centre
  - Procurement of Drugs from PHC to ASHA worker

- Female MPW : Functions
  - MCH, ANC, PNC, Immunization, Family planning
  - OPD + daily survey
  - Maintenance of sub centre.

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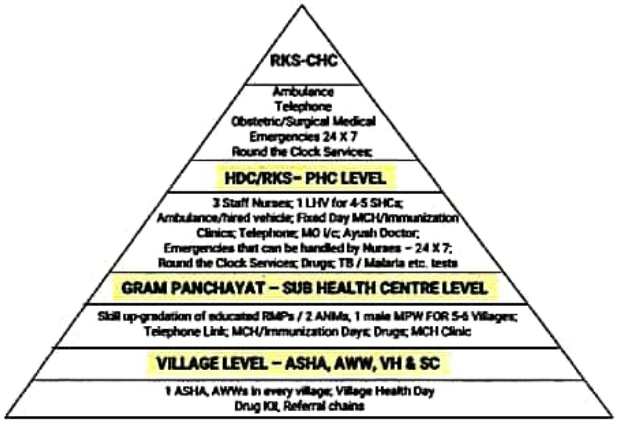
Health Assistant :

- Important link between Doctor of PHC and grass root level workers .
- 1 medical officer will have - 12 MPW, 30 ASHA under him .
- The management is done by health assistant .
- Responsible for maintenance of records .
- Procurement of drugs & stock keeping .

Centres v/s number of beds

00:22:48



- Village - No beds
- sub centre
  - A - No delivery service
    - No beds .
  - B - Delivery service
    - K/a MCH - SC
    - 2 beds .
- PHC - 4- 6 beds
- CHC - 30 beds
- DH - > 80 beds .

Sub centres : 2 types : A & B .

- B
  - low load
  - high load - >20 deliveries/month .

PHC : 24 x 7 functioning health centre

- A - < 20 deliveries/day
- B - >20 deliveries/day
  - Less load - 20 - 30 delivery/day
  - Heavy load - ≥30 delivery/day

Rogi Kalyan samiti :

- Community participation for management of health centre .

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Health Personnels in various centres :

Suggested norms for health personnel

Category of personnel	Norms suggested
1. Nurses	1 per 5,000 population
2. Health worker female and male	1 per 5,000 population in plain area and 3,000 population in tribal and hilly areas.
3. Trained dai	One for each village
4. Health assistant (male and female)	1 per 30,000 population in plain area and 20,000 population in tribal and hilly areas. Provides supportive supervision to 6 health workers (male / female).
5. Pharmacists	1 per 10,000 population
6. Lab. technicians	1 per 10,000 population
7. ASHA	1 per 1,000 population

- RKS - CHC → 46 - 52
- PHC → 13 - 20
- SUB Health centre → 2 - 6
- village → 1. ASHA

1 Anganwadi worker → under ICDS; for 400 - 800 population
→ Receive 4 month training
village health guide → 200hrs of training
ASHA worker - 23 days training

Targets

00:30:57

to be achieved by 2020

- Reduce MMR to 1/1000 live births
- Reduce IMR to 25/1000 live births
- Reduce TFR to 2.1
- Prevention and reduction of anemia in women aged 15–49 years
- Prevent and reduce mortality and morbidity from communicable, non-communicable; injuries and emerging diseases
- Reduce household out-of-pocket expenditure on total health care expenditure
- Reduce annual incidence and mortality from tuberculosis by half
- Reduce prevalence of leprosy to <1/10000 population and incidence to zero in all districts
- Annual Malaria Incidence to be <1/1000
- Less than 1 per cent microfilaria prevalence in all districts
- Kala-azar elimination by 2015, <1 case per 10000 population in all blocks.

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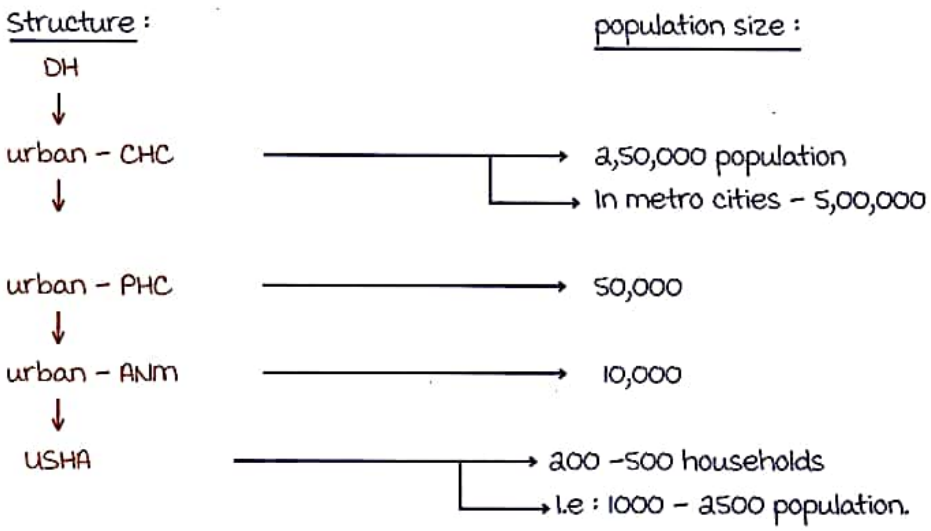
NUHM

00:32:40



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HEALTH PLANNING & MANAGEMENT

Committees in health care

00:00:33

1946 – Bhore committee
1962 – Mudaliar committee
1963 – Chadha committee
1965 – Mukherjee committee
1967 – Jungalwalla committee
1973 – Kartar Singh committee
1975 – Shrivastava committee
1986 – Bajaj committee
2002 – National health policy (5 year plans)

1946 Bhore committee :
- Chairman : Sir Joseph Bhore.
- Primary recommendations :
  a) Integration of preventive and curative services.
  b) Development of PHC for 40,000 population.
  c) Long term plan : 3 Million plan → 75-bedded hospital for 10,000 -20,000 population.
  d) 3 month rural posting during internship.

Mudaliar committee :
- Chairman : Dr. A.L. Mudaliar.
- Health survey and planning committee
- Proposed to launch All India Health Services. Based on Indian Administrative Services.

Chadha committee :
- Launched in 1963.
- Linked malaria worker and family planning worker and renamed them as Basic Health Workers for 10,000 population

Mukherjee Committee – 1965.
- Proposed delinking of malaria and family planning workers.

Jungalwalla committee – 1967
- Dr. Jungalwalla → Director, National Institute of Health and Family Welfare.
- Recommendations :
  a) Unified cadre
  b) Recognition of extra qualifications.

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c) Equal pay for equal work.
d) Special pay for special work.
e) No private practice by government doctors.

1973 Kartar Singh Committee.

1975 Shrivastava committee

1986 Bajaj committee

- Recommendations :
  a) National Medical and Health Education Policy
  b) National Manpower Policy
  c) Establishment of health universities and Educational Commission for health services.

Objective / Target / Goal 00:15:10

Goal :
- Long term
- Ultimate desired end point.

Target :
- Quantifiable
- Achievable
- Mid term end points.

Objective :
- Short term end points.

* Impact indicator of a programme is usually the target / objective.

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Health planning 00:18:22

Planning cycle :

1. Analysis of health situation
2. Establishment of objectives and goals
3. Assessment of resources
4. Fixing priorities
5. Write - up of formulated plan.
6. Programming and implementation
7. Monitoring
8. Evaluation.

After evaluation of programme, analysis of health situation is repeated and the cycle continues.

Functions for effective planning

P - Planning
O - Organisation
S - Staffing
D - Direction
Co - co-ordination.
R - Review
B - Budget

Behavioural sciences 00:21:50

- Human resource management techniques :
  1. Organisational design : Hierarchy
  2. Personal management :
     - Motivation
     - Intellectual capacity → Right people at the right job.
  3. Communication :
     - Adequate communication between workers and higher authorities.
  4. Information systems :
     - Reporting systems.
  5. Management by objectives :
     - Incentives provided to workers for achieving targets.

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Quantitative methods : 00:25:12

Network Analysis :

- method to implement the planned activity by arrow and dot diagrams.
- Analyse the constituents, resources available, and how to go about implementing the activity.

- Sequence of events can be understood by 2 techniques.
  a) Programme evaluation and review techniques (PERT) : uses arrow diagrams to know which event to be conducted and the order.
  b) Critical path method (CPM) : it is the longest path to achieve the objective.
  Helps to understand the shortest time required to complete the programme.

Cost Benefit Analysis :

- Analyses the monetary benefit of a programme
  i.e money spent and money earned from the programme.

Cost Effective Analysis :

- Analyses the money spent and health benefits achieved (lives saved or disability avoided)

Work Sampling :

- Systematic observation and recording of activities of a worker.
- Random assessment and documentation of work done → provides information about manpower needs, job performance and satisfaction.

Zero Budget Technique :

Budget analysis

Incremental Budget.	Zero Budget technique
• Analysis of budget required in excess of previously existing budget.	• Analyse programme from initial level and come up with a budget. Benefit : Innovative and more open to changes.

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Evaluation techniques 00:36:25

- To evaluate a programme, following methods can be taken up :
  a) Monitoring – ongoing evaluation.
  b) Surveillance – ongoing evaluation with support and scrutiny.
  c) Impact assessment : whether targets of the programme are achieved.
  d) Incremental cost effectiveness ratio (ICER)

$$ICER = \frac{\text{Cost of product A} - \text{Cost of product B}}{\text{Effectiveness of A} - \text{Effectiveness of B}}$$

Efficiency and Effectivity

Efficiency : Input – output analysis under ideal / lab conditions.

Effectivity : Input – output analysis under practical or real conditions.

Inventory control / Procurement 00:40:30

1. FIFO :
   - First in first out method.
   - Based on expiry of drugs.

2. GIGO :
   - Principle for waste management.
   - Garbage in – Garbage out method.

3. ABC analysis :
   For Eg: A – low cost drugs.
   B – Medium cost
   C – Expensive drugs.

4. VED analysis :
   V – Vital drugs
   E – Essential drugs
   D – Desirable drugs.

Note : Matrix of ABC and VED analysis can be used to analyse procurement personnel.

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Eg

	V	E	D
A	low cost vital drugs		
B			
C			Expensive desirable drugs

- A – V or low cost vital drugs can be procured by anybody.
- C– D or expensive – desirable drugs can be procured only with permission of higher authorities.

Six – sigma

- Certification launched by motorola.
- Provides information about number of human errors in an event. (i.e 10^{-6} errors in one event)
- High level of certification of quality of an organisation.

Evaluation indicators of health services 00:45:00

1. Relevancy
2. Adequacy
3. Accessibility
4. Acceptability

} Basic criteria (most essential)

5. Effectivity : Programme should be practically implementable.
6. Efficiency : input – output should show a positive response
7. Impact : Target / objective should be achieved.

Operations research 00:46:05

- Research of the systems, organisation and functioning of a programme.
- Research on the operations of a programme.

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INTERNATIONAL HEALTH

International Health Agencies

- WHO
- UNICEF
- FAO
- Ford foundation
- ILO
- UNDP
- World bank
- USAID
- Red cross
- Rockefeller

WHO

00:01:11

- World Health Organisation

1902 : Pan American Sanitary (1st organisation)

↓

1923 : Health organisation of league of Nations

↓

1948 : Formation of WHO
(7th April)

World Health Organization

- Headquarters : Geneva , Switzerland
- Function :
  - Prevention and control of disease
  - Family health
  - Research and statistical analysis of data
  - Biomedical research
  - Environmental health

- Organisation :

Secretariat	Executive body	World health Assembly
↓	↓	↓
Managerial function	31 members	Final approval
	↓	Of the projects
	1/3rd member	under WHO
	renewed every year	

Regional offices of WHO	Head office
1. South East Asia	New Delhi
2. Africa	Congo
3. America	Washington. D. C.

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4. Europe → Copenhagen, Denmark
5. East Mediterranean → Alexandria, Egypt
6. Western Pacific → Manila (Philippines)

United Nations International Children Emergency Fund [UNICEF]

00:07:13

- Formulated in 1946
- Headquarters : New York (US)
- Functions :
  - Mother and child Health
  - Nutrition, immunization and education
- Initiatives :
  - BFHI : Baby friendly hospital initiative
  - GOBIFFF :
    - Growth monitoring
    - ORS
    - Breast feeding
    - Immunization
    - Family planning
    - Food to the mother
    - Female literacy

Food and Agricultural Organisation (FAO)

00:09:38

International Labour Organisation (ILO)

00:10:54

Headquarters : Geneva, Switzerland
Formulated in 1919
Functions :
- Increase social justice
- Economical and social stability

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United Nations Development Program (UNDP) 00:11:38

Office : NewYork , US
Formulated in 1966
Concerned with efficient
Utilisation of manpower ,
Human and natural resources .

UNFPA → United Nation Fund for Population Activities
↓
For family planning and maternal and child health services (MCH)

The world Bank
UN agency promoting peace
Improves the living standards
Of population .

USAID 00:13:43

United states Agency for International Development
Helps in controlling communicable disease
- Malaria program
- TB Nutrition program

Helps to improve the water supply and Sanitation

Red cross 00:14:36

Formulated by Henry Dunant , 1864
Provide first aid (disaster, war)
In India → Bangalore , Karnataka

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The Rockefeller foundation

00:15:47

- Philanthropic foundation
- Established the All India Institute of Hygiene and Public Health (AIIPH), Kolkata (west Bengal)
- Headquarters : New York , US
- Works for upliftment of rural areas

↓

Employment , power
Climate and H_2O conservation
health and disease

Ford foundation

00:17:36

- For rural health in india
- Formulated the National Institute of Health Administration and Education, Delhi
  Water supply and sanitation in West Bengal

Bill and Melinda Gates foundation

00:18:20

Philanthropic foundation
Works for diseases like TB , HIV
Promotes JE vaccination
GAVI : The Global Alliance for vaccine and Immunisation, comes under this foundation

SIDA – Swedish International Development cooperation Agency
Funds the RNTCP

Danida

00:19:13

- Danish International Development Cooperation
- Initiated the National programme for Control of Blindness (NPCB)
- Helps in the control of leprosy and RNTCP

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Care foundation

- Started in North America, 1945
- Office : Atlanta, Georgia, US
- Works for MCH, women health, Adolescent health, child health, Prevention of anaemia.

Theme for WHO (2019) :

'Health for all'

Universal health coverage by everyone and everywhere

Bioterrorism Agents

00:22:00

• Category A (first highest priority)	↑ mortality ↑ morbidity	↑ Public health impact, requires special action from agencies
• Category B (Second highest priority)	↑ morbidity mortality<A	Enhanced efforts by agencies
• Category C (Third highest priority)	↑ ↑ mortality ~ morbidity	engineered micro organisms ↓ may be used for mass destruction in future

Category A :

Anthrax : Bacillus anthracis
Botulism : Clostridium botulinum toxin
Plague : Yersinia pestis
Small pox : Variola major
Tularemia : Francisella tularensis
Viral hemorrhagic fevers : Ebola, hassa, machupo

Category C :

Emerging infectious diseases → Nipah virus and Hanta Virus

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Notifiable diseases under International Health Regulations

Cholera	Relapsing fever	Influenza
Plague	Rabies	SARS
Yellow fever	Salmonellosis	Malaria
Small pox	Polio	Louse borne typhus fever

- Among these, the diseases which have pandemic threat are : Cholera, Yellow fever, Plague, Influenza and Poliomyelitis.

International travel regulations 00:30:18

For Pregnant woman,

In domestic airlines → travelling is allowed up to 32 weeks

In cruise → < 24 - 28 weeks

In order to travel to Yellow fever endemic countries

↓

Yellow fever card is required

↓

Yellow fever vaccine is taken

↓

17 - D (Live vaccine)

↓

(Can be given during pregnancy if required)

Validity of the vaccine : 10 days the vaccination, For life time

AAI (Aedes Aegypti Index) 00:33:16

No. Of Aedes Aegypti found with n 400 mm of a particular area.

It should be < 1 for all international seaports and airports.

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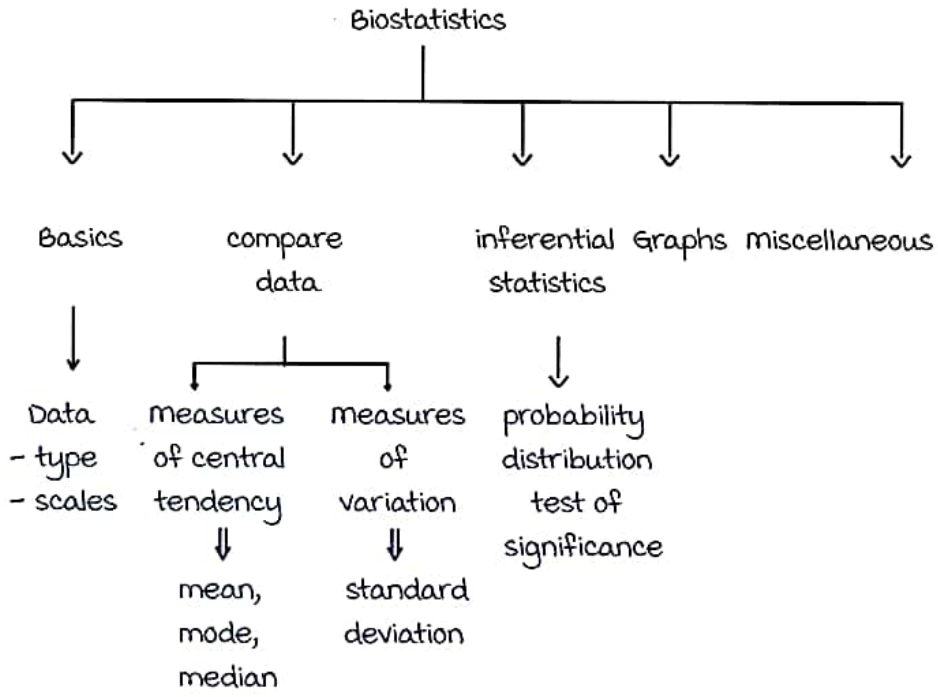
INTRODUCTION & DATA IN BIOSTATISTICS

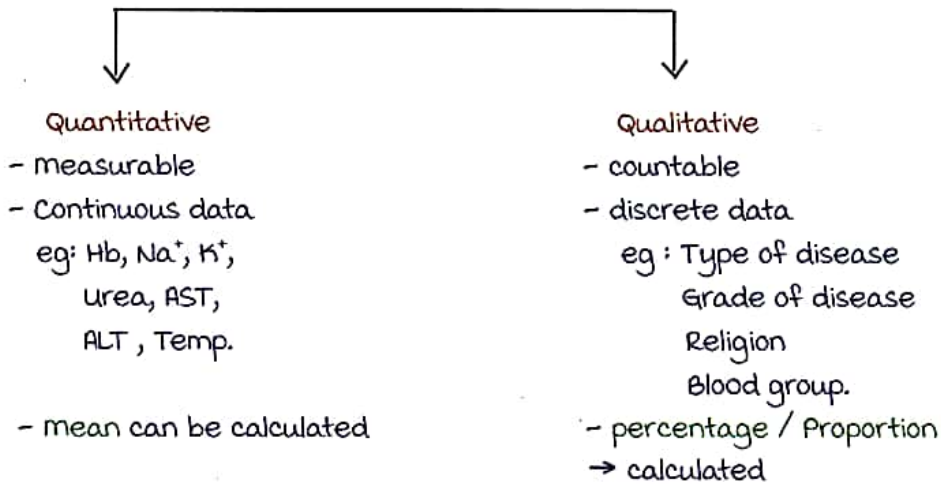
Importance of biostatistics

- to interpret variations [significant / non significant] } inferential statistics
- to define cut off for various diseases
- Graphical representation of data
- comparison of data



Data in statistics

00:10:38



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Scales

00:15:47

Nominal	Ordinal	Interval	Ratio
- Named data - No sequence - Qualitative eg :Type o disease Religion, Blood g	- Ordered data - has sequence / Order - Qualitative eg: Grade/ severity/ stage of disease	- No absolute Zero - No start point - Quantitative eg: °c, °F -Interval / difference between values can be calculated	-Absolute zero⊕ - start point⊕ - Ratio can be calculated - Quantitative eg: Height, Weight, Urea, Na^+, AST, ALT, Temperature in K

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MEASURES OF CENTRAL TENDENCY & VARIATION

Central tendency

00:00:15

- Mean: Simple average. Denoted by "$\bar{x}$"

- Are of 3 types : • Arithmetic mean
  - Average, $\frac{\Sigma}{n}$ { Σ = Summation; n = Sample size }

  • Geometric Mean
  - Used for exponential data
  - Data with extreme values

  Eg: HDI (Human dDevelopment Index)

  • Harmonic Mean
  - Used for inverse data, fractional data, negative growth data

- Advantages: - Best measure of central tendency
  - Easiest measure
- Disadvantage: Most affected by extreme values

- Median: It is the central value after arranging them in ascending / descending order
- Advantage: Least affected by extreme value

- Mode: It is the most frequently occurring value
- Advantage: - Most Robust measure of central tendency
  - It is the last to change with variation of Data

Mode = 3 median − 2 mean

Calculate Hb in gm % among 2 villages A & B ?

A = 9, 10, 11, 11, 7, 9, 10, 10, 11, 13, 9, 10

B = 12, 10, 11, 11, 10, 9, 8, 8, 10, 12, 11, 10

Rearrange

A − 7, 9, 9, 9, 10, 10, 10, 10, 11, 11, 11, 13

B − 8, 8, 9, 10, 10, 10, 10, 11, 11, 12, 12

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A	B
$\bar{X} = \frac{120}{12} = 10$	$\bar{X} = \frac{122}{12} = 10.6$
median = 10	median = 10
mode = 10	mode = 10

Measures of variation

00:10:49

- Range: Maximum value − Minimum value
- Standard Deviation (SD)
  It indicates the mean deviation of the values from the mean

SD = RMSD (Root of mean of Squared Deviations)

$$SD = \sqrt{\frac{\Sigma (x - \bar{x})^2}{n}}$$

A = 7, 9, 9, 9, 10, 10, 10, 10, 11, 11, 11, 13

$\bar{X}$ A = 10

SD → = −3, −1, −1, −1, 0, 0, 0, 0, +1, +1, +1, +3

$(x - \bar{X})^2$ = 9, 1, 1, 1, 0, 0, 0, 0, 1, 1, 1, 9

$SD \rightarrow A = \sqrt{\frac{24}{12}} = \sqrt{2} = 1.414$

- Co-efficient of variation (CV): Denoted by " σ "

$$CV = \frac{SD}{mean} \times 100 \Rightarrow \boxed{CV = \frac{\sigma}{\bar{x}} \times 100}$$

- Variance (V):

$$V = (SD)^2 \Rightarrow \boxed{V = \frac{\Sigma (x - \bar{x})^2}{n}}$$

Standard error

00:20:00

" It is deviations of the mean of different researcher's from the population mean / common mean"

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Standard Error (SE) are of 2 types:

- SE for mean (SEm):
  - For quantitative data

$$SEm = \frac{SD}{\sqrt{n}}$$

Eg:- If there are $\bar{X}_1$, $\bar{X}_2$, $\bar{X}_3$,

$$SEm = \frac{SD_1}{\sqrt{n_1}} + \frac{SD_2}{\sqrt{n_2}} + \frac{SD_3}{\sqrt{n_3}}$$

- SE of Proportion (SEP):
  - For qualitative data

$$SEP = \sqrt{\frac{PQ}{n}}$$

P = Prevalence

Q = 100 − Prevalence

n = Sample size

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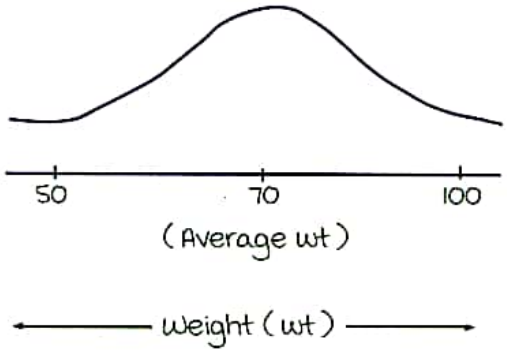
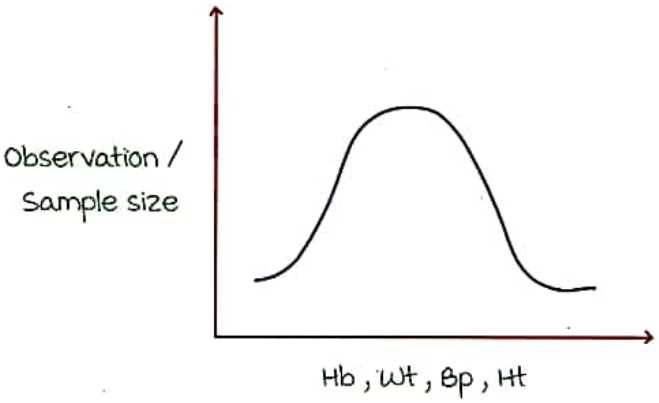
NORMAL DISTRIBUTION CURVE

Distribution curve

Eg : Weight of student in the class



Normal distribution curve



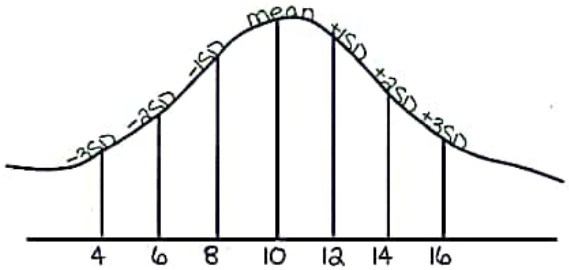
Features of normal distribution curve

00:03:00

- A/K/A Gaussian distribution
- Bilaterally symmetrical bell shaped curve
- Ends never touch the baseline
- mean = median = mode = coinicide
- AUC = 1 (Area under curve = 100 %) , Sd = 1 , V = 1

Eg : Hb = $\bar{x}$ = 10 ± 2 gm/dl

Where 1 sd = 2 gm/dl



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Assumptions in normal distribution curve

00:08:56

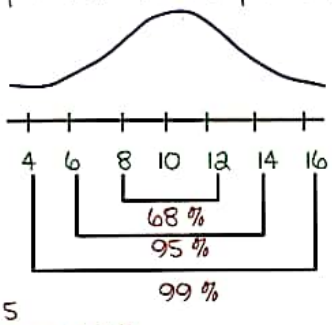
- Two assumptions :-

  First : i) Between −1 SD and +1 SD = 68 %

  ii) Between −2 SD and +2 SD = 95 %

  iii) Between −3 SD and +3 SD = 99 %

Eg 1. Mean Hb of 10 ± 2 SD, how much population will be expected to have between :



i) 8 − 12 gms = 68 %

ii) 6 − 14 gm % = 95 %

iii) 4 − 16 gm % = 99%

iv) 8 − 10 gm % = $\frac{68}{2}$ = 34 %

v) 10 − 12 gm % = 34 %

vi) Less than 6 gm % = 100 − 95 = $\frac{5}{2}$ = 2.5 %

vii) more than 6 gm % = 100 − 2.5 = 97.5 %

viii) Less than 14 gm % = 97.5%

ix) Less than 4 gm % = 100 − 99 = $\frac{1}{2}$ = 0.5 %

x) 12 − 14 gm % = 95 − 68 = $\frac{27}{2}$ = 13.5 %

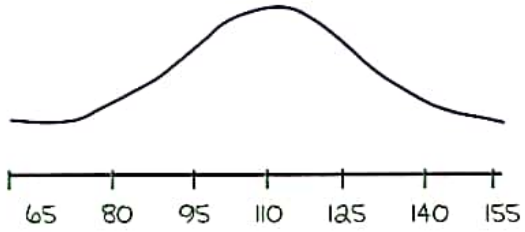
Eg 2. Mean BP in 2973 individuals = 110 ± 15

cut off for hypertension = 140 mmHg

How many are expected to be diagnosed with hypertension

3000 × 2.5 %

= 75 %



Normal zone (Second assumption)

00:18:30

- Zone of normalcy / normal zone − Between − 2 SD and + 2SD = 95 %

Z Score

- A / K / A standard device
- The concept of finding the location is known as Z score
- tells the location of variable in terms of the standard deviation (SD) / standard error (SE)

$$\text{Formula} = \frac{\text{observed value} - \text{Expected value}}{\text{SD/SE}}$$

- Abnormal Z score = > ± 2 SD

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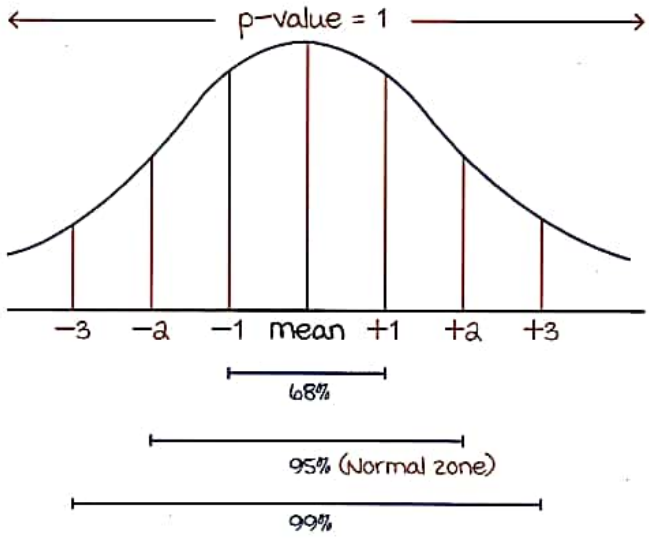
CONCEPT OF p-VALUE

- p-value means probability value
- p-value is based on inferential statistics

p-value and normal distribution curve 00:03:24



- p-value (probability value):
  * p-value = 1 is maximum probability (ie. 100% chance)
  * p-value = 0 is minimum probability (ie. 0% chance)
- Standard errors (S.E):
  ±1, ±2, ±3, ...
- Confidence limit / interval:-

* +1 to −1: 68% confidence interval
* +2 to −2: 95% confidence interval, p-value: 0.05 – Normal Zone
* +3 to −3: 99% confidence interval

p-value and normal zone, abnormal zone 00:09:30

Example: p-value of group A and group B in a study

Group-A: BP = 160 mm Hg → drug x 1month → BP = 150 mm Hg

Group:B = 160 mm Hg → placebo x 1 month → BP = 154 mm Hg

p-value of the study = 0.02 (Abnormal / out of normal zone)

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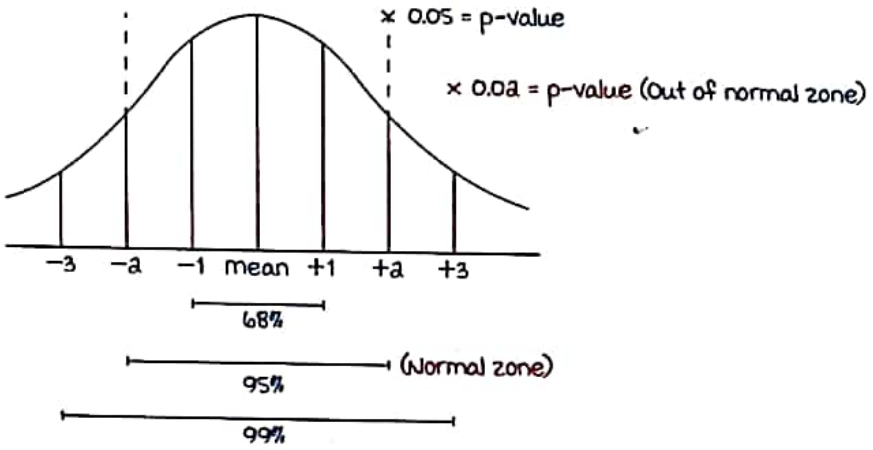

p-value > 0.05	p-value < 0.05
• Normal variant	• Abnormal variant
• Non-significant	• Significant
• No effect found	• Effect present
• Null hypothesis-accepted	• Null hypothesis-rejected

p-value and confidence level

00:16:10

P-value (95% is usually considered normal)

95% → 68%
(If 68% is considered normal)
- Previously non-significant → Significant
- Chance of rejecting null hypothesis ↑
- Chance of α - errors (type I) ↑

95% → 99%
(If 99% is considered normal)
- Previously significant → Non-significant
- Chance of accepting null hypothesis ↑
- Chance of α - errors ↓ (or) β-errors (type II) ↑

* Preferred zone for a study: 95%
* Do not prefer: a) 68% zone has high α- errors (type I error)
  b) 99% zone has high β - errors (type II error)

α - error / α - level / α - value

00:26:14

- α - Error: The probability of finding an effect (just by chance) which is not present in reality
- α - value corresponds to p-value
- Example: p-value of 0.02 corresponds to α - value-2 % (significant difference)
  p value of 0.05 corresponds to α - value - 5 %

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- If α-error is 2% (i.e. There is 2 % chance of being wrong in the study)

Type I error:

Rejecting a null hypothesis, which in reality is true

Type II error:

Accepting a null hypothesis, which is non-true (false) in reality

95 % confidence limits:

- Z-score : ± 1.96 standard deviation (SD) or (SE)
  : ~ ± 2 SD (SE)
- p-value : 0.05
- α - value : 5%

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TEST OF SIGNIFICANCE

Definition

Mathematical derivations to derive the "P value".

Types of test of significance

00:03:00

Two types

- Parametric — Quantitative data (Qn)
- Non parametric — Qualitative data (QL)

Parametric Test	Situations for test of significance	Non parametric Test
Paired 't' test	Single group	Mc Nemar's test
Unpaired 't' test A/K/A Independent sample 't' test	Two groups	χ^2 test (Chi Square test)
Analysis of variance (ANOVA), multi analysis of variance (MANOVA).	Three or more groups	i) Chi square for trend ii) Kruskal-Wallis Test.

Other tests of significance

00:07:12

i) Large sample (n>30), quantitative data = 'Z' test.
ii) Ordinal data – Wilcoxon rank test (W/R)

- For grouped data → W/R Sign test
- for ungrouped data → W/R sum test

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Other biostatistic tests

00:09:35

- Check for
  - i) Normalcy of data – Kolmogorov smirnov test
  - ii) Outliers – Dixon's Q test
  - iii) Level of agreement between two or more observers
    - KAPPA TEST

$$\text{Formula} = \frac{\text{Observed level of agreement} - \text{expected level of agreement}}{1 - \text{expected level of agreement.}}$$

Example :- observed level of agreement = 50%

Expected level of agreement = 80%

$$K = \frac{0.5 - 0.8}{1 - 0.8} = \frac{0.3}{0.2} = 0.15$$

iv) Internal consistency of a questionnaire – Cronbach's alpha score

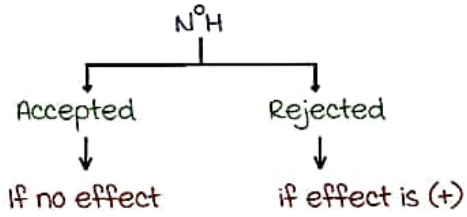
v) Compare a new statistical test with a gold standard test – Bland Altman analysis.

Null hypothesis and errors in biostatistics

00:13:20

- Null hypothesis (N°H) → No effect
  → Two groups are same
  → No difference between groups

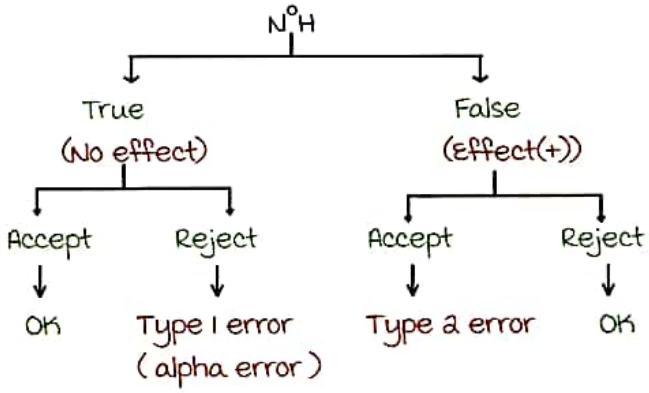
N°H
- Accepted → If no effect
- Rejected → if effect is (+)



Null hypothesis In reality

00:17:32

N°H
- True (No effect)
  - Accept → OK
  - Reject → Type 1 error (alpha error)
- False (Effect(+))
  - Accept → Type 2 error
  - Reject → OK



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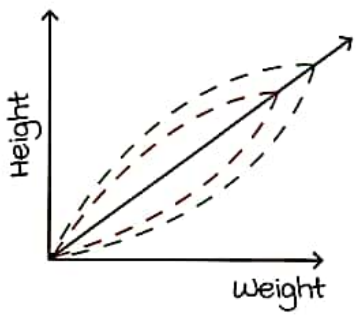
CORRELATION, REGRESSION, SKEWNESS

- Correlation : Correlating 2 variables
- Regression : Prediction
- Skewness : Deviation from a normal distribution

Correlation 00:01:00

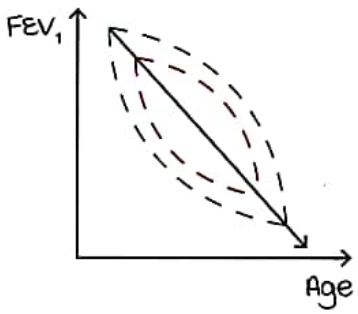
- Correlation between 2 variables
- Correlation curves: Examples

a.



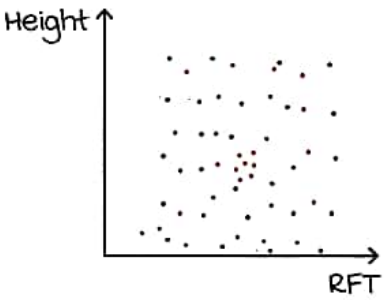
- Scatter plot
- Positive correlation: As one variable ↑, the other variable also increases
  - Vector: Strength and direction of association

b.



- Negative correlation: As age ↑, FEV_1 ↓
  - FEV_1 is forced Expiratory volume in first minute
- As one variable increases, the other variable decreases

c.



- No correlation between height and RFT (Renal Function Test)

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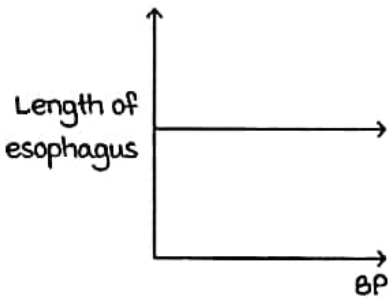
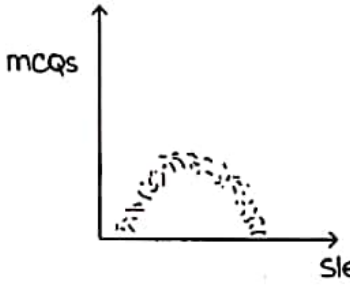
d.



- No correlation between length of esophagus and Blood pressure (BP)

e.



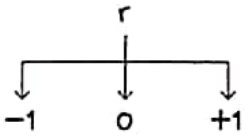
- Non linear / Curvilinear correlation

Types of correlation

00:07:00

Linear correlation
- Also called as Pearson correlation
- Represented as 'r'

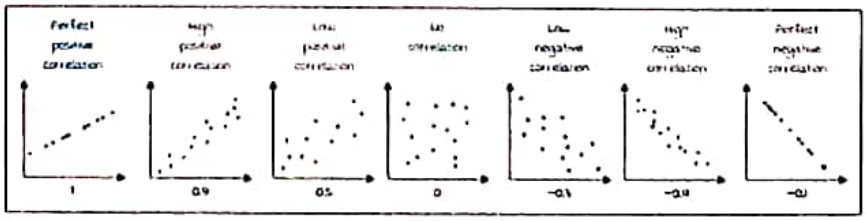
Non-linear correlation
- Also called as curvilinear, Spearman correlation
- Represented as ρ (rho)



- − 1 is perfect negative correlation
- 0 is no correlation
- + 1 is perfect positive correlation

Value of r and correlation

00:12:54



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If r is < 0.5 ⇒ Weak correlation

r : 0.5–0.7 ⇒ Moderate correlation

r : > 0.7 ⇒ Strong correlation

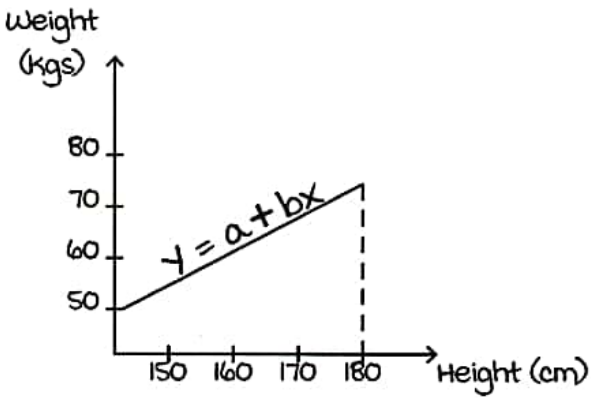
r = 1 ⇒ Perfect correlation

Co-efficient of determination (CD) 00:16:03

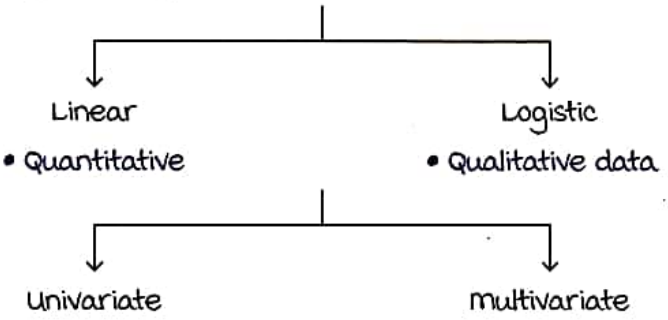
- CD = r^2 expressed in percentage (%)
- Definition: Percentage variability in one factor due to change in another factor

Regression 00:20:48

- Regression means to predict
- Regression equation is $y = a + bx$
- Example:



- Types of regression:



4 types – Univariate linear
Univariate logistic
Multivariate linear
Multivariate logistic

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☐ Example – variables: smoking, myocardial infarction ⇒ Univariate logistic

– variable: Urea, GFR ⇒ Univariate linear

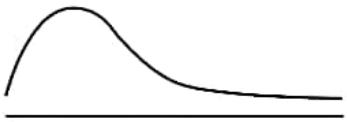
- Equation: $y = a + bx$ y: Regression variable (dependent)
  x: Independent variable
  b: Variable co-efficient (slope of the curve)
  a: Regression constant

- For regression of multiple variables, equation: $y = a + b_1x_1 + b_ax_a + ...$

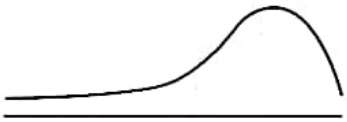
Skew / Kurtosis 00:29:58

- Graphical: Skew
- Mathematical: Kurtosis
- Normal distribution: Gausian distribution
- Abnormal distribution: Skew distribution
- 2 types:

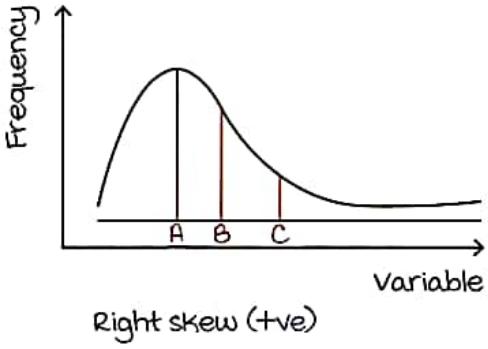
(i) Right skew / Positive



(ii) Left skew / Negative



- Mean, Median, Mode



A – Mode (peak)
B – Median
C – Mean
Mean > Median > Mode

Right skew (+ve)

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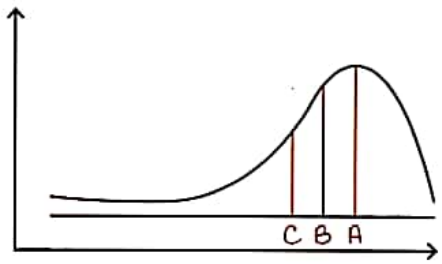


A – mode

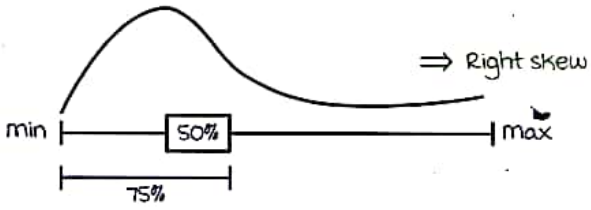
B – median

C – mean

mean < median < mode

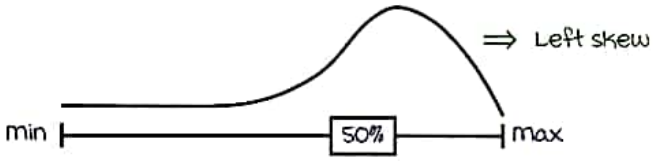
Box and whisker:

a.

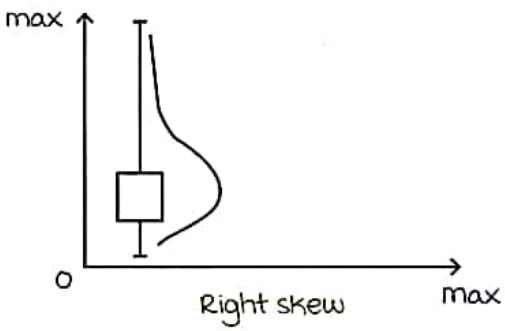


- Each box corresponds to 50%
- Whisker corresponds to 25%

b.



c.



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SAMPLING METHODS & SAMPLE SIZE

Sample : small proportion of the whole .

- Sample should be of adequate number and should have adequate representation of the population

Sampling methods

00:01:08

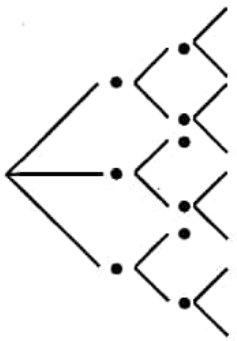
Types of sampling methods :

Non probability sampling (Non - random)	probability sampling (Random)
• Convenient sampling	• simple random sampling
• Quota sampling	• systematic sampling
• Purposive sampling	• stratified sampling
• Snowball sampling	• cluster sampling

* Probability sampling is better than non - probability sampling

Non - Random sampling :

1. Convenient sampling :
   - No preset rule .
   - Easiest method .
   - High chance of bias .
2. Quota sampling :
   - Predefined set of rules present
3. Purposive sampling :
   - A secondary intention present while picking the sample .
4. Snowball sampling :
   - Done for hidden diseases / disease with social stigma .
     eg : intravenous drug abusers , HIV , Homosexuals , commercial sex workers .
   - One subjesct is asked to bring his/her acquaintances as subjects of the Study .



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Probability sampling methods

00:07:25

1. Simple Random sampling :
   - eg : Lottery method , Random number selection .
   - Easiest method
   - Best method (chance of bias is very less)
   - Simplest method .
2. Systematic sampling :
   - n^{th} individual taken as subject for the sample .
3. Stratified sampling :
   - population is divided based on another variable of interest .

Types :

a) Simple stratified sampling : from each group , equal number of subjects are selected .

- Disadvantage : may not be representative of the population .

b) Special stratified sampling :

Probability proportional to size sampling (PPS) :

After dividing the population ,a proportionate number of subjects are chosen from each strata .

Ensures equal representation of all groups .

Example : sample size of 90 required from population of 1000 people to analyse for hypertension .

Population divided based on socio-economic status in to upper, middle , and lower class .

- Simple stratified : 30 people picked from each group .
- PPS sampling : Less number of people picked from the smaller group .

4. Cluster sampling :
   - Done for a large population
   - Population should be homogeneous (usually)
   - Cluster selection : Random , naturally existing clusters are selected
   - After clusters are selected , subjects can be chosen by any method of sampling .
   - Used in : evaluation of health services .

eg:- National Iodine Deficiency Disorder control programme : 30 clusters with 90 children each are chosen based on school enrollment ratio and gender .

- Universal Immunization programme : 30 clusters with 7 children Picked from each cluster . Total of 210 children analysed in every area .

Sample size

00:18:27

$$\text{Sample size} = \frac{4\,PQ}{L \times L}$$

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Where,

P → Prevalence

Q → 100 − Prevalence

L → absolute allowable error

Q. calculate sample size for a study to find prevalence of hypertension with 95% confidence limits. Absolute allowable error : 10%

prevalence in population : 30%

$$\text{sample size} = \frac{4PQ}{L \times L} = \frac{4 \times 30 \times 70}{10 \times 10} = 84$$

NOTE : If relative error is mentioned, error percentage of prevalence is to be calculated.

i.e if relative error = 5 %

L = 5 % of prevalence

$$\frac{5}{100} \times 30 = 1.5$$

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MISCELLANEOUS TOPICS IN BIOSTATISTICS

Probability rules

00:01:14

- Probability → 'P'
  P = Chance in decimal points
- Pre-test probability → Prevalence
- Post-test probability → Positive Predictive Value (PPV)

- Prevalence = 10%

  1. Probability of 2 people A and B, 'both' having disease

     P (A) → 0.1

     P (B) → 0.1

     P (both) → 0.1 × 0.1 = 0.01 (Rule of multiplication)

  2. Probability of any one or either one among A and B having disease

     P (A) → 0.1

     P (B) → 0.1

     P (any) → 0.1 + 0.1 = 0.2 (Rule of Addition)

- The prevalence of gastric cancer was found to be 10%
  and that of blood group B is 40%

  1. Chance of a person to have blood group B and gastric cancer

     P (Gastric Ca) → 0.1

     P (Blood grp B) → 0.4

     → 0.1 × 0.4 = 0.04.

  2. Chance of a person to have either blood group B or gastric cancer

     → 0.1 + 0.4 = 0.5

  3. Chance of person to have blood group B or gastric cancer, but not both

     → 0.5 − 0.04 = 0.46

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Leave Feedbac

Standardisation

00:14:05

- Is necessary when a comparison is made between 2 areas, with different age structure
- Types:

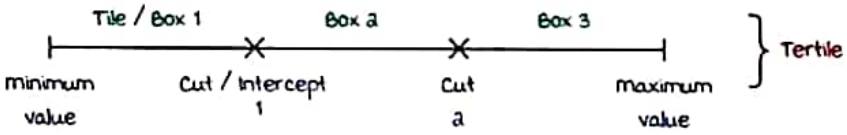
  1. Direct Standardisation
     - If the age specific rates (as death rates) are available

  2. Indirect Standardisation
     - No age specific rates are available for the study / reference population
     - Calculates Standardized mortality Rate (SMR)

$$= \frac{\text{Observed death}}{\text{Expected death}} \times 100$$

Concept of tiles

00:20:24



- A Quartile has
  - → 3 cuts and 4 tiles (Q_1, Q_2, Q_3, Q_4 → Quartiles)
  - → median: between Q_2 and Q_3 → IInd intercept or cut
  - → 25% population
- A Hexile
  - → 5 cuts and 6 tiles (H_1, H_2, H_3, H_4, H_5, H_6)
  - → median: Between H_3 and H_4 → 3rd cut or intercept
- A Centile
  - → median: C_{50}
  - → 99 cuts and 100 tiles

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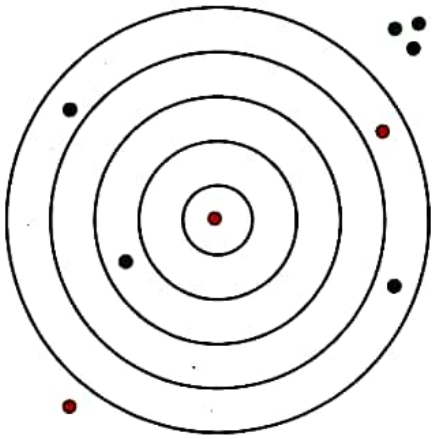
Validity, accuracy, precision

00:24:46

- Example: A dart board



VALIDITY	ACCURACY	PRECISION
1. 3/3	0/3	0/3
2. 2/3	1/3	0/3
3. 0/3	0/3	3/3

- Validity
  - The test measures the parameter within a defined range

- Accuracy
  - Nearness to true value (actual)
  - Diagnostic accuracy → PPV

- Precision
  - Repeatability
  - Reproducibility
  - Same results with repeat activities
  - Precision $\propto \frac{1}{\text{Standard error}} \propto$ Sample size (n)
  - Greater the sample size, better the precision

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Disclaimer

- These Notes do not cover all the points, especially conceptual points, discussed in the videos. The information in this book is meant to complement Marrow videos and should be used in conjunction with the videos. Special emphasis on certain points and MCQ solving approach has to be understood from the videos only.

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GRAPHICAL PRESENTATION OF DATA

Broadly classified into 2 areas:

Quantitative	Qualitative
• Histogram	• Barchart
• Frequency Polygram/ Curve	• Piechart
• Ogive	• Spot map
• Line chart / line diagram	• Pictogram
• Scatter plot/diagram	• Venn diagram

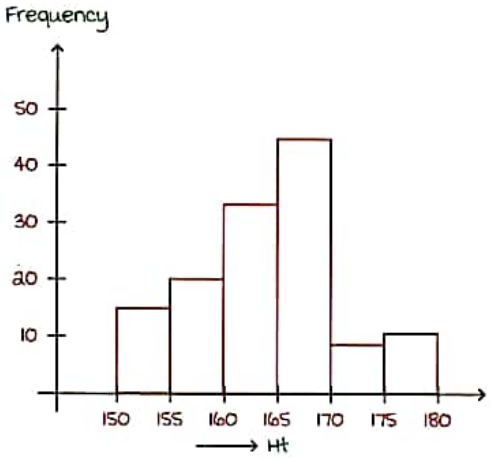
Other methods: – Stem & leaf plot
– Box & whisker plots

Histogram & Barchart

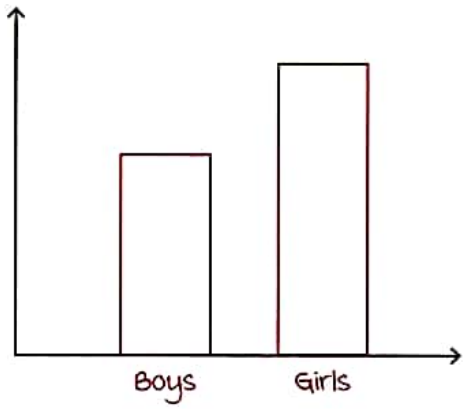
00:02:25

Histogram:

- Graphical representation of Height of students in centimeters.
- Ht in cm: 150–155=15
  155–160=20
  160–165=35
  165–170=45
  170–175=5
  175–180=10



"Histogram"



"Bar Chart"

To represent Number of Boys & Girls:

↓ 50 ↓ 70

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Histogram:

- Column Chart drawn for quantitative data are usually presented without a gap
- It is a joint Column chart (No gap between bars)

Bar Chart:

- Column Charts drawn for qualitative data
- Gap is present between the columns

In histogram;

Mode: Most frequently Occuring value

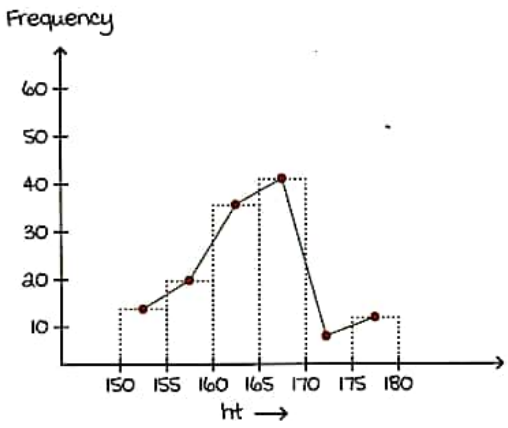
Median: It is the central value after rearranging the values in ascending / descending order

In the above histogram; Mode is 165-170cm (Column 4)
Median is in column 3

Frequency polygram

00:12:14

- Joining midpoints of a histogram
- Mean, median & mode can be calculated



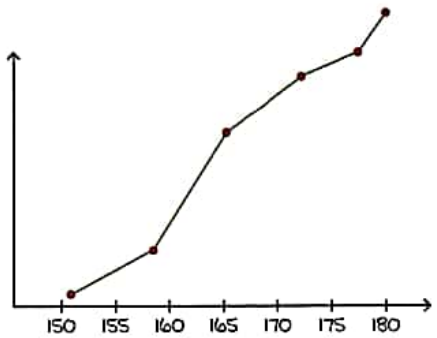
Cumulative frequency

00:14:30

It is calculated by adding each frequency from a frequency distribution table to the Sum of its predecessors

Ht in Cm: Cumulative frequency

150-155 =15 → 15
155-160 =20 → 35
160- 165 =35 → 70
165-170 =45 → 115
170- 175 =5 → 120
175-180 =10 → 130



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OGIVE:

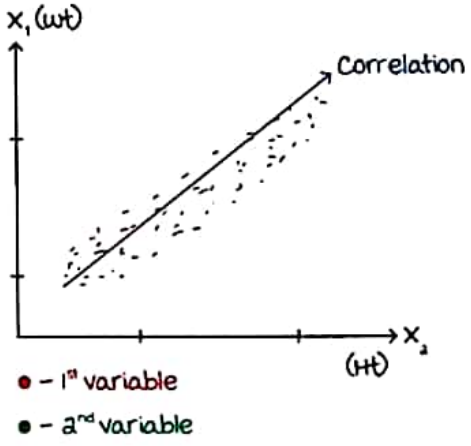
- The Curve drawn for Cumulative frequency is Known as Ogive
- Used for percentile
- It tells us Cut off for inter class intervals

Line diagram: Graph drawn with one entity as Time

- Tells about "time trends"

Scatter plot/ Diagram:

- Always between 2 Variables
- Used in Correlations
- Tells about strength of association, its direction



Qualitative data

00:22:17

i) Bar diagram

ii) Pie chart – Always in form of a circle

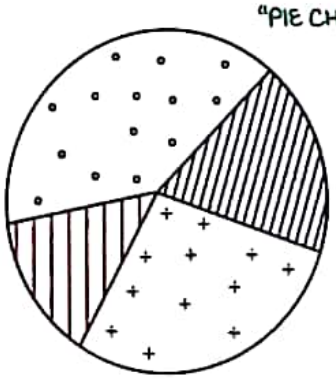
With in circle there will be Sectoral representation

- Always in Percentages
- Never in absolute Numbers

iii) Spot map

- Geographical presentation of data
- Represents establishments (like placements of School, hospital etc), type of disease, mortality, fertility etc

"PIE CHART"



iv) Pictogram – Symbolic presentation of data

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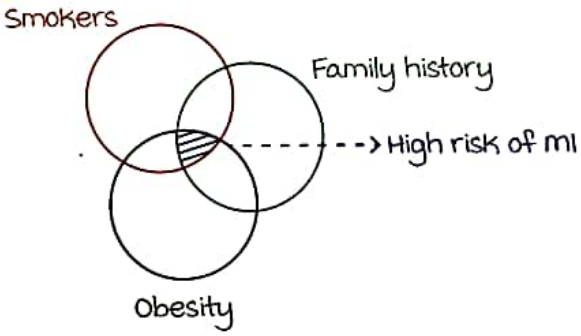
v) Venn diagram – Overlapping Qualitative data

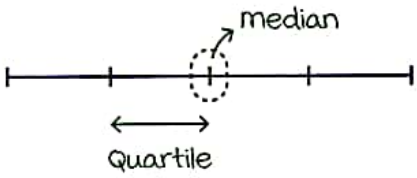
Eg:



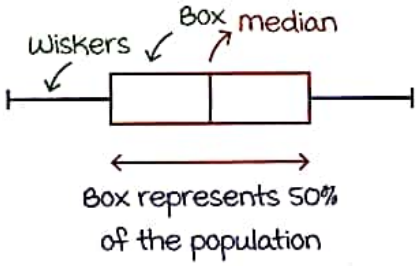
Box & Whisker plot

00:26:18

If a given data is split into 4 equal parts it's called Quartiles
In a Quartile – Centre is the median



∴ The Centre 2 Quartiles are Box and the ones on either side are Whiskers



A Whisker contains 25% of population each

Whisker is of 2 types → • lower & • Higher

↓ min area ↓ max area

Hence they are useful charts to tell about distribution of data

- If the values are more Condensed in a Box and whisker plot, the median is more Precise

  ie: as range ↑ → Sample size ↑

  as range ↓ →preciseness ↑

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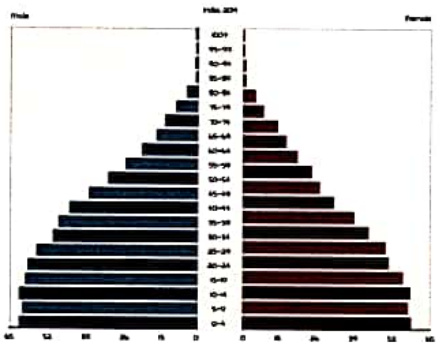
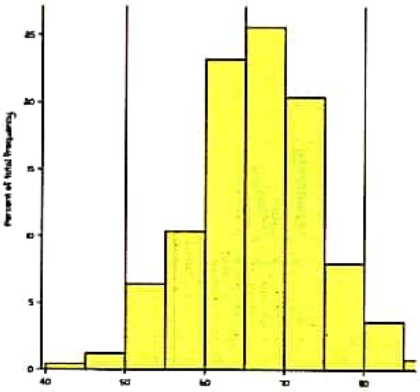
Graphs

00:31:11

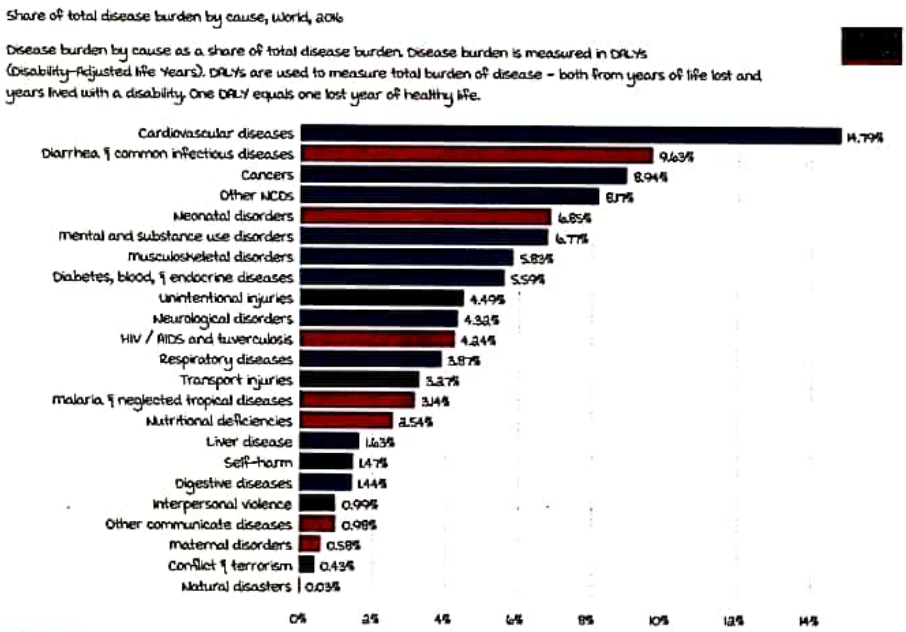
HISTOGRAM



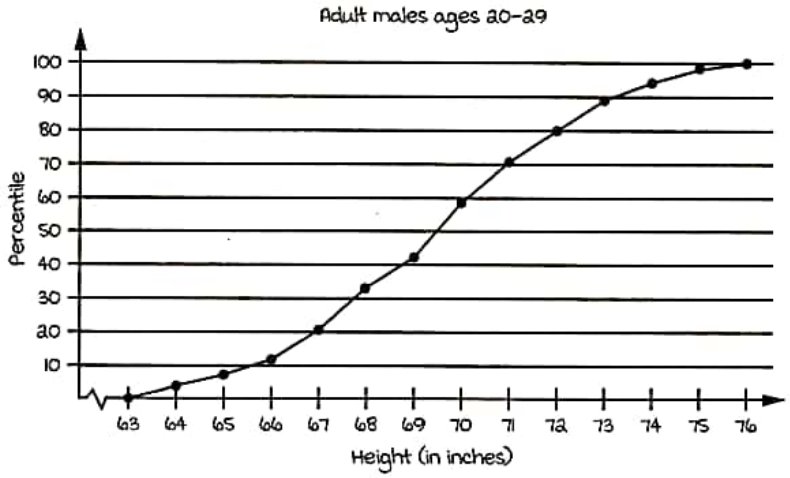
COLUMN CHART



BAR CHART



OGIVE



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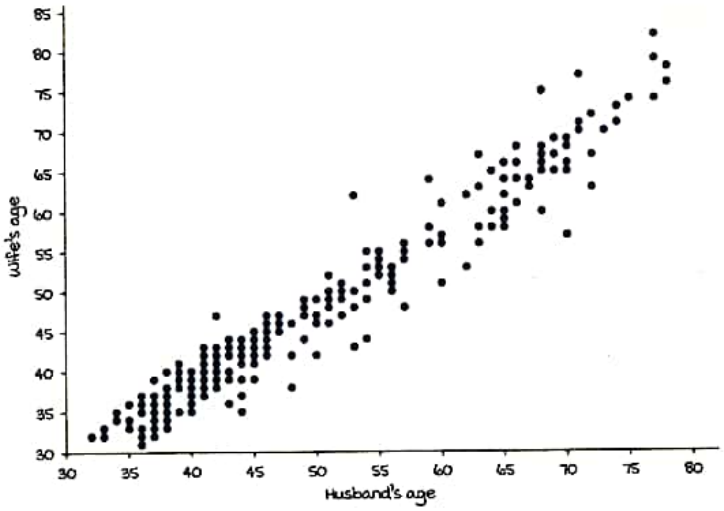
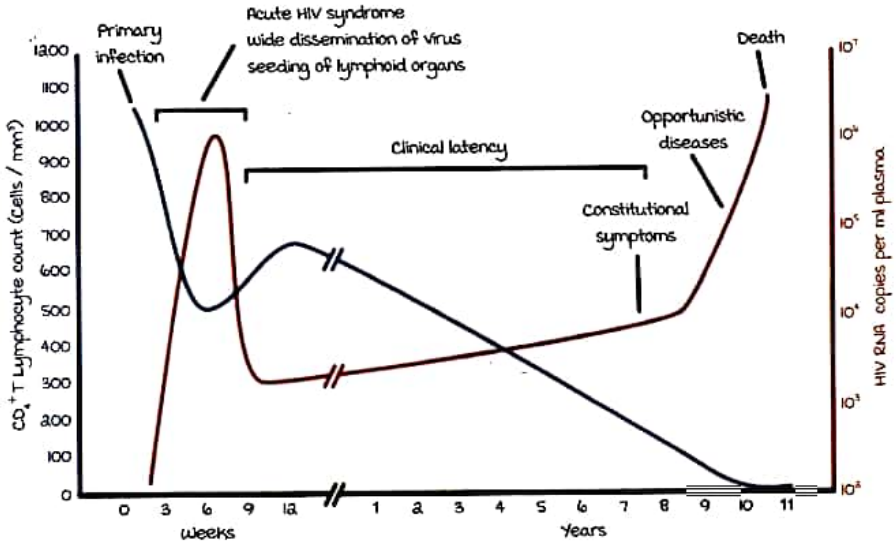
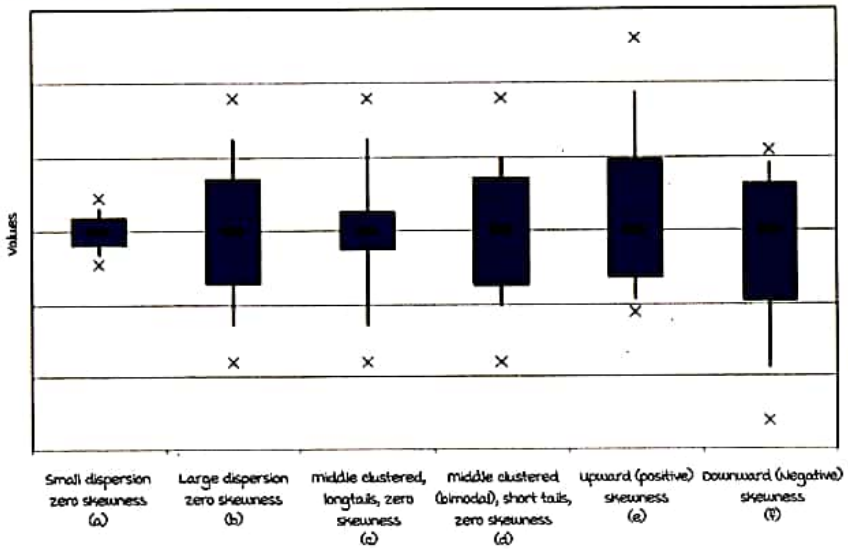
SCATTER PLOT



LINE DIAGRAM



BOX & WHISKER



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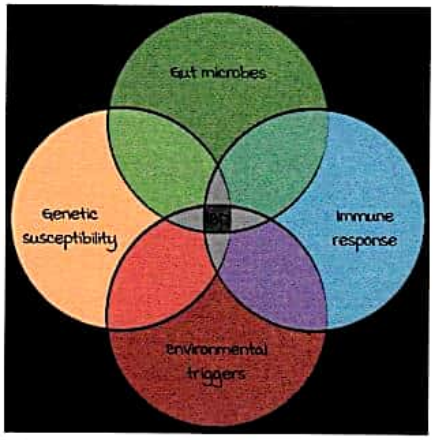
VENN DIAGRAM



STEM & LEAF PLOT

Girls		Boys
9, 2	9	
6, 1, 0, 0	10	5, 8, 9
8, 7	11	0, 1, 1, 7
6, 5, 5, 5, 4, 2	12	3, 7, 7, 8
7, 1, 0	13	3, 3, 4, 4, 6, 9
9, 8	14	4, 4, 5
8, 6, 2, 0, 0	15	0, 1, 2, 3, 7
7	16	2, 2, 2, 5, 8
	17	1, 6
8, 0	18	2, 8
9	19	5
4	20	

- Tells us about data distribution in population

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GENETICS & HEALTH

- Tjio & levan – described chromosome number as 46 in humans
- Har Gobind Khorana – codes of nucleic acid and also for development of Synthetic genes & nucleic acids
- Watson / Crick / Wilkins – gave us double helical structure of DNA
- In normal human body 30,000 genes present

Genetic disorders

00:02:50

These can be of three types :

- Chromosomal abnormalities :
  - Autosomes : Down's syndrome
  - Sex chromosomes : Klinefelter syndrome (xxy), super male (xyy), super female (xxx), Turner's syndrome.

- Unifactorial abnormalities : include mendelian diseases
  Autosomal dominant (AD) : marfans, retinoblastoma, AD polycystic Kidney disease, ABO – blood group,
  Autosomal Recessive (AR) : Inborn errors of metabolism
  X linked dominant (XD) : X – linked vit D resistant rickets
  X linked recessive (XR) : Hemophilia, G6PD, color blindness

- Multifactorial abnormalities : Cancers, diabetes, coronary artery disease, IHD, mental retardation, peptic ulcers etc.

Mendel's law

00:07:00

- Law of unit characters –
  " All characters are units & genes which controls the characters ".

- Law of dominance –
  " All the genes occur in pair & one gene will be dominant and other gene is recessive ".

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- Law of segregation –
  " When germs cells are formed, only one of the alleles is randomly passed to off spring ".

Hardy Weinberg law 00:08:54

- This is for population statistics .
  " Frequency of an allele in the population will remain same, until there are external factors ".

External factors :
- Mutation (Antigenic shift / drift)
- Migration (Selective)
- Natural selection
- Non random mating (Assortive)

Founder effects :
This is responsible for " difference in the distribution of disease in population "
It is due to difference in expression of the genes in founding population .

Genetics & preventive health 00:13:23

- Health promotion
- Specific protection
- Early diagnosis & treatment

Health promotion measures 00:14:06

- Eugenics
- Euthenics
- Genetic counselling
- Genetic preventive measures

Eugenics : Promote the health & wellness of human race
- Positive Eugenics : Individuals with good genes reproduce more, so that these genes are maintained .
- Negative eugenics : To ↓ the frequency of a bad gene . By means of genetic counselling .

Euthenics : Environmental manipulation – to provide optimum environment for the genes to express freely

Dysgenics : Due to change in environment ; deterioration of expression of the gene ; leading to ↓ growth of population .

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Genetic counselling : Counselling of individuals to manipulate with their genes .

These are of 2 types,

(i) Prospective genetic counselling :
People who are at risk are counselled . Usually done before marriage, so that the defective gene is not propagated to the off spring . Useful in thalassemia, sickle cell disease

(ii) Retrospective genetic counselling :
Parents visit the counsellor, as the previous child is already suffering from certain disease . It is done so to find out the probability of propagation of the disease to the next off spring .

Genetic preventive measures :

- ↓ Consanguineous marriages ; as it ↑ chances of Albinism, Alkaptonuria, phenylketonuria .
- Not promote late marriages .

Specific protection

- In pregnancy - avoid x-ray
- In pregnancy - not to expose themselves to mutagens like harmful insecticides, pesticide, alcohol, smoking, chemicals like lithium .

- Giving anti - D - globulin - preventing risk of Rh incompatibility .

Early diagnosis & treatment 00:24:51

- Check pregnant female for any chromosomal abnormality & subject them to any preventive / treatment measures .

  - Fetoscopy
  - USG
  - Maternal serum alfa feto protein (MSAFP) testing
  - hCG assay
  - Amniocentesis

  These are modes of early diagnosis for genetic defects during pregnancy .

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Indications	methods

Prevention stage	Conditions	Strategy
Rh incompatibility	Post partum Anti D globulin	Primary prevention
Congenital rubella	Adolescent girl immunization	
Congenital malformations	Folic acid supplements, Control of maternal diabetes ANC counselling (healthy diet)	ANC screening and primary prevention
Congenital malformations	GDM screening and early control High risk maternal screening Carrier screening for hemoglobinopathies	
Congenital malformations	Congenital malformation screen of the newborn, physical examination	Neonatal screening Early detection and treatment
Congenital hypothyroidism PKU, congenital hyperbilirubinemia testing Inborn errors of metabolism	Biochemical screening of the newborn	

If mother is diabetic → Controlling sugar is primary prevention for the baby.

- Healthy female, in pregnancy GDM screening is done, this is primary prevention for the baby.
- New born screening for congenital malformation is 2° prevention.

Advances in molecular genetics 00:32:03

- DNA technology – Newer DNA probe techniques, FISH (fluorescent insitu hybridization), RT – PCR (Real time – PCR)
- Gene therapy – Introduction of new genes.
- Human genome project – Mapping of human gene
- Human genome diversity project – It is mapping of genes to understand human evolution.
  It is collection of samples from all the indiginous population.
  It is used to understand – • Founder effect
  • Health & disease of the community.

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- GRAPH international :
  (Genome based research and population health)
  - It is to integrate the genetic development & understanding into public health & policies.

Genetic epidemiology 00:37:26

" To find genetic causes for genetic diseases " - is genetic epidemiology.

This includes,

- Familial aggregation studies
  to determine if there is any genetic component

- Segregation studies
  to understand pattern of inheritance

- Association studies
  to study alleles in the genomes & pattern of expression & association

Further more - " molecular epidemiology " is done to assess molecular risk factors ; leading to disease

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